LETTERS AND PAPERS

ON

Agriculture, Planting, &c.

ADDRESSED

TO THE

SOCIETY instituted at BATH,

FOR THE ENCOURAGEMENT OF

Agriculture, Arts, Manufactures, and *Commerce,*

Within the Counties of Somerset, Wilts, Gloucester, and Dorset, and the City and County of Bristol.

VOLUME III.

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SELECTED FROM

THE CORRESPONDENCE-BOOK

OF THE

SOCIETY INSTITUTED AT BATH,

FOR THE ENCOURAGEMENT OF

AGRICULTURE, ARTS, || MANUFACTURES, And COMMERCE,

WITHIN THE COUNTIES OF

SOMERSET, WILTS, || GLOCESTER, And DORSET,

AND

THE CITY AND COUNTY OF BRISTOL.

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M DCC XCI.

TO

THE RIGHT HONOURABLE

THE EARL OF AILESBURY,

AS

PRESIDENT OF THE BATH SOCIETY,

AND A

GENEROUS PATRON OF AGRICULTURE

AND THE USEFUL ARTS.

THIS THIRD VOLUME OF THE SOCIETY's

SELECT PAPERS

IS MOST RESPECTFULLY INSCRIBED.

Obſervations on the comparative Purgative and Aſtringent Effects of the ſeveral Kinds of Rhubarb.

[By Dr. PARRY.]

FROM the firſt claſs of theſe experiments it appears, that the Turkey rhubarb operated more than either of the two others, in one caſe only. No. I. operated moſt frequently in four caſes. No. II. moſt frequently in two caſes. The Turkey operated leaſt frequently in two caſes. No. I. in three. No. II. in three. In two caſes the Turkey and No. II. operated equally; while in one of theſe No. I. acted more powerfully than either, and in the other not at all. In one caſe No. I. and No. II. acted alike; and both more than the Turkey. One exhibition of each kind of the rhubarbs produced equal effects in the caſe of Jane Middleton's child; but neither the Turkey rhubarb, nor No. I. in two other experiments on the ſame patient, operated at all before twelve the next day, when her mother called on me.

So far as theſe few experiments go, we may infer that the ſpecimen of Engliſh rhubarb No. I. was fully equal in its purgative effects to the Turkey, and that they are both in quality ſomewhat ſuperior to No. II. This concluſion is farther ſtrengthened by the experiments in the caſes of Greenaway, Rolf, and Stuart, Claſs II. In the laſt of theſe, the Engliſh rhubarb No. I. was more powerful than the Turkey, and in all three than No. II. It muſt alſo be obſerved that in the two firſt experiments with No. II. in the caſe of Gore, no effect was produced by the quantity it there exhibited.

The aſtringent effects of rhubarb may be divided into two kinds: thoſe which ſeem immediately to ariſe from the

the medicine; and thoſe which appear after it has operated as a purgative. The chemical experiments above-recited ſhew the exiſtence of an aſtringent principle in all the rhubarbs, and the degree in which it takes place; but we cannot from thence draw any certain concluſion with reſpect to their operation on the human body. I have known the gum kino, the ſtrongeſt vegetable with regard to taſte with which we are acquainted, purge more violently than jalap. How far, indeed, the aſtringent quality of rhubarb with regard to the bowels is ſeparable from its power as an aperient, and whether therefore it poſſeſſes that quality in a higher degree than any other purgative equally draſtic, experience, I think, has not hitherto aſcertained.

Let us however examine the properties of our different kinds of rhubarb in caſes of diarrhœa, in which alone we can form a true judgment of their effects. In the examples of Gibbons and H. White, the rhubarb No. II. ſhewed an immediate power of diminiſhing the number of ſtools; for in both there were fewer motions on the days on which it was taken, than on others. This alſo appeared from the firſt exhibition of the ſame rhubarb in the ſeveral caſes of Greenaway, Jane White, and Allen. No. I. ſeemed to have the ſame property in the caſes of Pye and Saunders; but the Turkey rhubarb in no inſtance. To ſhew theſe effects ſtill more clearly, we may obſerve, that in ſeven of fourteen experiments made in the above caſes of diarrhœa with the rhubarb No. II. that medicine diminiſhed the number of ſtools the day on which it was given; No. I. in two of ten experiments; the Turkey in no inſtance out of four.

To enter into a diſquiſition concerning the cauſe of theſe differences, would belong more properly to a col-

lection of medical than agricultural eſſays: but I think it probable, that the rhubarb No. II. diminiſhed the number of motions not by any direct aſtringency, but by its gently cathartick power, which was juſt ſuch as to ſtimulate the bowels ſufficiently to make them diſcharge the greateſt part of their contents in a few evacuations; while the other rhubarbs, by their ſtronger purgative quality, produced alſo a conſiderable diſcharge of the mucus of the bowels. This concluſion ſeems to correſpond with the comparative coſtiveneſs which ſuccceded the cathartick operation of each rhubarb; that being much alike after the Turkey rhubarb and No. I.; and after both much greater than from No. II. although the latter was ſufficient to remove the purging in the caſes of Greenaway and Jane White.

Obſervations and Experiments on certain Specimens of Engliſh and Foreign Rhubarb, being an Attempt towards eſtimating their comparative Virtues.

Tentanda eſt via—— VIRG.

[By A. FOTHERGILL, M. D. F. R. S.]

IT is remarkable that Botaniſts, till very lately, have been greatly divided in their opinion concerning the ſpecies to which the officinal rhubarb belongs. Thus the *rheum palmatum*, the *undulatum*, and the *compactum*, have each in their turn been pronounced to be the true ſpecies. At length the queſtion appears to be determined by the celebrated Dr. PALLAS, in favour of the firſt of theſe; and as he had every advantage of examining them on the ſpot, we may now, I think, ſafely conclude that the *palmatum* is the genuine plant. How far indeed the *hybrid* plant, produced from the union of the *palmatum* and *undulatum*,

dulatum, may hereafter be found equal, or (as ſome think) ſuperior to either of the parent plants, muſt be left to future obſervation.

At preſent, the *palmatum* only demands our attention. If this plant can, by proper attention to its culture, and manner of preparing it, be brought at length to rival the foreign rhubarbs, which are annually imported at a very heavy expence, it will certainly become a conſiderable acquiſition to this country. The Turkey, the Ruſſian, and even the Eaſt-Indian rhubarbs, at preſent, it muſt be confeſſed, are more ſightly to the eye, and conſequently more marketable, than the Engliſh; but it is likewiſe well known, that much artifice is uſed in raſping, colouring, and other manœuvres, to render them ſuch. By theſe methods their outward appearance is ſo much improved as eaſily to impoſe on our ſenſes, and even to induce ſome eminent druggiſts to conſider them as greatly preferable to the Engliſh. But it behoves the faculty to examine whether rhubarb may not acquire ſome noxious quality from the colouring ſubſtance employed, and whether the griping effects ſo frequently complained of, may not ſometimes proceed from the *Dutch yellow*, extracted from buckthorn berries, with which the root is commonly coloured.

The art of diſguiſing, and variouſly ſophiſticating drugs, is now become a ſcience; and the dangerous conſequences reſulting from this pernicious practice call aloud for the interpoſition of the legiſlature.

The foreign rhubarb may be ſuppoſed to acquire ſome advantages from ſoil, climate, culture, and the mode of drying; but much more, I apprehend, from its ſuperior age. The root has not been cultivated in this climate till within theſe few years; whereas the foreign rhubarb, according

cording to the teſtimony of the learned Profeſſor BERGIUS, is not taken up till it is eleven or twelve years old, which alone may perhaps be found ſufficient to conſtitute the difference. This circumſtance at leaſt ſeems to deſerve future inquiry. In the interim, let us endeavour to aſcertain their comparative virtues.

With reſpect to the ſpecimens of Engliſh rhubarb No. I. and No. II. which were lately committed to my examination by our worthy Secretary, I have hitherto only had opportunity of making the following trials. The ſhrivelled ſcabrous appearance of theſe ſpecimens ſeems to denote ſome material defect to have taken place in the article of drying and curing the roots, which can only be learnt by experience.

It may not be improper to hint, that all the larger roots ought to be perforated through the centre, this part of the plant being the moſt liable to decay, and the proceſs of drying ought to be performed with expedition. The proper degree of heat may be aſcertained by dint of obſervation, and adjuſted with accuracy by the thermometer.

EXPERIMENT I. Four tinctures were drawn by macerating Turkey, Eaſt-Indian, and the Engliſh rhubarbs No. I. and II. of each half a drachm in an ounce of proof ſpirit, in four ſeparate vials, for three days. The tinctures, being ſtrained and filtered, appeared nearly ſimilar as to ſmell and colour, only the two former ſeemed rather more aſtringent and aromatic to the taſte.

EXP. II. To ſixty drops of each of theſe tinctures, was added a ſingle drop of a ſolution of ſalt of ſteel in a ſmall glaſs. The two tinctures of foreign rhubarb almoſt inſtantly aſſumed a duſky green, inclining to black, while the tinctures of the Engliſh rhubarb only acquired a darkiſh brown colour.

EXP. III.

Exp. III. To each of the above tinctures were now added five drops more of the chalybeate ſolution; when the Turkey and Eaſt-Indian tinctures became conſiderably more black, particularly the former. The tincture of the Engliſh rhubarb acquired a deeper brown, particularly No. I. but by no means equal to the tincture of the Turkey rhubarb.

Exp. IV. To illuſtrate this more clearly, the four mixtures were uſed as ink, and the names of each were written with them ſeparately on writing paper, which paper is incloſed, and accompanies the four tinctures for the Society's inſpection.

Exp. V. To a ſtout young man, who was troubled with a painful ulcer in his leg, were given 60 grains of the powder of Eaſt-Indian rhubarb, with the uſual regimen: it operated only twice.

Exp. VI. At the interval of forty-eight hours, he took the ſame quantity of Engliſh rhubarb No. I.: this operated four times,

Exp. VII. At the like interval, he took the ſame quantity of Engliſh rhubarb No. II. which operated briſkly three times.

Exp. VIII. Laſtly, he took of Turkey rhubarb only forty-five grains, which however operated four times, though leſs briſkly than the Engliſh. All of them tinged the urine alike, and operated without occaſioning any nauſea, ſickneſs, or gripes.

REMARKS.

It has already been obſerved, that the tincture of the Turkey rhubarb taſted rather more aromatic than the reſt; and from Experiments I. II. III. and IV. it would appear, that it poſſeſſes a ſomewhat higher degree of aſtringency than the Eaſt-Indian; and that this rather exceeds the two Engliſh tinctures as to the aſtringent quality. For it is the known property of ſalt of ſteel, or copperas, to ſtrike a black colour with aſtringents, and that in proportion to the degree

degree of aſtringency; hence the ſuperiority of galls as an ingredient in ink, being one of the ſtrongeſt aſtringent vegetables hitherto diſcovered.

From Experiment V. it would appear, that the Eaſt-Indian rhubarb is actually a weaker purgative than any of the reſt; and yet this is the drug which is by far moſt commonly uſed, in the ſhops eſpecially, for making the tincture.

From Experiments VI. and VII. we ſee that the Engliſh rhubarb, eſpecially No. I. poſſeſſes the purgative power in a ſuperior degree.

From the VIIIth Experiment it appears, that forty-five grains of the Turkey rhubarb contain the purgative quality, nearly equal to ſixty of the Engliſh, or in other words, that the Engliſh rhubarb requires to be given to the amount of about one-fourth more, to produce the ſame effect. This coincides very nearly with the reſult of ſome former trials which were made ſome years ago, before the Engliſh plant had acquired ſufficient growth: but ſome later experiments evince, that it approaches nearer and nearer to the foreign rhubarb in proportion to its age. On the whole, I think it is evident, that the culture of rhubarb in this country ought not to be diſcouraged, or the efficacy of the Engliſh plant contemned, till it has undergone a fair and candid trial. But on the contrary, various circumſtances evince, that it deſerves farther encouragement, and farther inveſtigation; by which there ſeems much reaſon to believe, that, in proceſs of time, we may be enabled not only to ſupply a ſufficient quantity of the genuine drug properly cured for home conſumption, but alſo for foreign markets. Many valuable exotics, after being inured to our climate, thrive ſurpriſingly, and at length become indigenous.

Thus

Thus the Engliſh ſaffron is now acknowledged greatly to ſurpaſs that of Spain and other countries; the aſſafœtida plant, though a native of Perſia, now flouriſhes in the botanic garden at Edinburgh; and it is to be hoped, that in time, the Engliſh rhubarb, which already rivals the Eaſt-Indian, may, by due attention, be brought to equal that of Ruſſia or Turkey.

BATH, *Dec.* 11, 1784.

Obſervations and Experiments on the comparative Virtues of the Roots and Seeds of Rhubarb; wherein ſome ſingular Properties of their Reſidua *(after aqueous or ſpirituous Tinctures had been extracted from them) are diſcovered.*

[By the SAME.]

Nil intentatum linquere. MART.

GENTLEMEN,

I SUBMIT to your conſideration the following additional experiments, as a ſupplement to my late paper on rhubarb.

Being deſirous to know whether the four different kinds of rhubarb, mentioned in my laſt, retained any purgative quality after the tinctures were drawn from them by proof ſpirit, I made the following experiments:—

EXPERIMENT I. Thirty grains of the reſiduum of the Turkey rhubarb were given in two ounces of ſpring water to the ſame young

young perſon who took the powder, and with the ſame regimen, I was not a little ſurpriſed, however, when he informed me that it operated three times, and that almoſt as briſkly as thirty grains of the ſame rhubarb had done a few days before, when given in powder.

Exp. II. At the interval of three days, he took the like quantity of the reſiduum of the Engliſh rhubarb No. I. This operated three times, and almoſt as freely as thirty grains of the powder of the ſame No. I. had done before.

Exp. III. At the like interval he took the reſiduum of the Engliſh rhubarb No. II. which alſo operated three times.

Exp. IV. At the farther interval of three days, the reſiduum of the Eaſt-Indian rhubarb was adminiſtered, but without producing any ſenſible operation. He experienced no ſickneſs, nauſea, or griping, from any of the above doſes. The ſmall ulcers in his leg had gradually aſſumed a better aſpect, and were now entirely healed, though no other medicine had been taken.

Exp. V. To a healthy perſon, in the prime of life, were given, at due intervals between each doſe, Turkey rhubarb, and Engliſh rhubarb No. I. and II. in powder, of each thirty grains. The two former operated only twice; the laſt operated three times very briſkly. Each tinged the urine, the Turkey rhubarb moſt; No. II. the leaſt.

Exp. VI. In order to determine whether the aſtringent quality of the rhubarb was intimately connected with the tinging property, ſo as to accompany it in the urinary ſecretion, ten drops of the chalybeate ſolution were added to a wine-glaſsful of the tinged urine on the ſeveral days that the above reſpective doſes of rhubarb were taken; but no viſible change of colour enſued.

Exp. VII. Towards the cloſe of the year 1784, a robuſt woman, aged 46, who had for the laſt ten days laboured under an obſtinate conſtipation of bowels, attended with frequent colick pains,

pains, flatulency, head-ache, and giddineſs, took at my requeſt of the powder of Engliſh rhubarb No. I. and II. in doſes of thirty grains each alternately, every other night, till ſhe had taken ſix doſes. No. I. generally procured three eaſy motions: No. II. ſeldom occaſioned more than two evacuations. The ſymptoms abated after the firſt doſe, and finally diſappeared before ſhe had taken the fifth, and have never returned ſince, tho' no other remedy was adminiſtered.

Exp. VIII. Four tinctures were again drawn from the four different kinds of rhubarb, by macerating ſixty grains of each in two ounces of proof ſpirit in ſeparate phials for ſeven days. On filtering the tinctures, and drying the reſidua, it was found that the ſpirit had extracted forty grains from the Turkey rhubarb; thirty-ſeven grains from the Eaſt-Indian; thirty-two grains from the Engliſh rhubarb No. I.; and thirty-four grains from No. II. The reſiduum of each, however, ſtill retained a conſiderable degree of aſtringency, as appeared from the inks which they yielded with the chalybeate ſolution. The characters written with them were indeed leſs black than in a former experiment; though ſufficiently ſo to mark out the aſtringent quality. The Turkey rhubarb give the darkeſt ſhade; the Engliſh No. II. the lighteſt.

Exp. IX. To a healthy middle-aged perſon, were given, at ſuitable intervals, in a glaſs of ſpring water, the reſidua of each of the tinctures alternately with an equal weight of the different rhubarb in powder; when it was again found, that the reſidua of each operated very nearly as much as the ſeveral powders; except that of the Eaſt-Indian, which had no ſenſible operation, while the powder of the ſame root operated twice. The reſidua likewiſe evidently tinged the urine, and proved diuretic, even before their cathartic operation commenced.

Exp. X. Since writing the above, Mr. Thomas Davis, late an ingenious apothecary at Bradford, to whom I had recommended ſome experiments with Engliſh rhubarb No. I. favoured me with the following account:—

"The

"The Engliſh rhubarb greatly exceeded my expectations; I gave it to a patient of a weakly habit, and found it operated both by ſtool and urine more powerfully than an equal quantity of the Eaſt-Indian rhubarb."

In a ſubſequent letter, he adds, "I am now well convinced that the Engliſh rhubarb, after being infuſed in boiling water, cold lime water, or rectified ſpirits of wine, does not remain an inert maſs deſtitute of virtue. I attended to the effects of theſe ſeveral preparations as cloſely as my time would admit, and having made the following experiments which you lately ſuggeſted, I ſhall now mention the reſult.

EXP. XI. "Having infuſed one drachm and a half of Engliſh rhubarb, in three ounces of boiling water, for twenty-four hours, and having ſtrained, dried, and pulverized the reſiduum, I gave forty-five grains of it to a poor man in two ounces of peppermint water; it procured two looſe ſtools in about five hours. In the evening he complained of griping pain of his bowels, with giddineſs, and pain of the head and loins, which obliged him at ſix o'clock to go to bed. Theſe ſymptoms increaſing, I viſited him at nine, and found his pulſe full, and that he had paſſed at leaſt a gallon of pale urine. Next morning I found him perfectly recovered.

EXP. XII. After infuſing the ſame quantity forty-eight hours in three ounces of rectified ſpirit of wine, I gave the ſame perſon, at the interval of three days, fifty-five grains of the reſiduum. The urine after the ſecond making was very pale, but not in ſo large a quantity as after the firſt doſe. It gave him eight very briſk motions without griping him.

EXP. XIII. After infuſing the like quantity in three ounces of cold lime water, I gave him, at the further interval of two days, fifty grains of the reſiduum. This procured only two ſtools, but as much urine as the firſt doſe. Before it operated, he complained of ſevere pain, but it ſoon went off." Thus far my correſpondent.——

REMARKS.

Remarks.

From Experiments I. II. III. and IX. it appears that the reſiduum of rhubarb, after a tincture has been extracted from it by proof ſpirit, inſtead of being reduced to a mere *caput mortuum* as has been commonly imagined, ſtill retains its purgative quality in an eminent degree, except the Eaſt-India rhubarb, which (in Experiments IV. and IX.) ſeemed to have entirely loſt it by maceration in the ſame menſtruum.

Exp. VIII. ſhews, that proof ſpirit does not deprive either foreign or Engliſh rhubarb of their aſtringency.

From Exp. X. XI. XII. and XIII. it further appears, that the Engliſh rhubarb is not diveſted of its purgative or diuretic power, by boiling water, rectified ſpirit of wine, or lime-water; and that the griping quality which rhubarb exerts in certain conſtitutions, ſeems to be increaſed by a watery menſtruum. The giddineſs and other ſymptoms being ſo remote from its uſual operation, ought rather to be attributed to peculiarity of conſtitution, or other adventitious circumſtances.

From Experiments V. and X. where the different powders were given in ſubſtance without any tincture being drawn from them, the purgative effects of the Engliſh ſeemed to be at leaſt equal, if not ſuperior, to thoſe of the foreign rhubarbs. The reſult of theſe experiments being ſomewhat different from ſome of the preceding ones, muſt be referred to difference of conſtitution in the perſons who took ſimilar doſes.

Experiment VI. Here the well-known property of rhubarb in tinging the urine of a yellow colour (even before its purgative operation takes place) ſhews the extreme

ſubtilty

ſubtilty of this portion of the drug in pervading the finer ſeries of veſſels; and its retaining this tinging property ſo tenaciouſly in Experiment IX. after a tincture had been drawn from it by ardent ſpirits, nay, even after circulating with various animal fluids, ſeems to point out, that, were it not for the high price it bears, rhubarb might be turned to good account as a colouring ſubſtance. Its yellow colour reſiſts aquafortis, and other acids, which deſtroy the colour of infuſions of ſaffron, turmerick, and other vegetable yellows.

From this experiment we further learn, that the tinging property is diſtinct from the aſtringent quality, ſince the urine, though deeply tinged with it, communicated no viſible blackneſs to a ſolution of martial vitriol, which it would not have failed to have done, had the urine contained any aſtringent impregnation. The aſtringent quality of this drug, therefore, does not appear to enter the blood veſſels, agreeably to what I have elſewhere remarked concerning the Peruvian bark.*

From Experiment VIII. it appears, that the two foreign rhubarbs yield more ſoluble parts to proof ſpirit, than either of the Engliſh, and that of the latter No. II. rather ſurpaſſes No. I. in this reſpect. But it is evident from the ſubſequent experiments, that the purgative power of rhubarb does not keep pace with its ſolubility in ardent ſpirits, becauſe the reſiduum, which remains inſoluble in that menſtruum, yet retains the purgative virtue; and the Eaſt-Indian, though more ſoluble, is yet leſs purgative than the Engliſh. It is remarkable, that the ſpirituous extract of rhubarb does not purge, but that the extract made by water after ſpirit does; as if the purgative quality reſided chiefly in a combination of gummy and ſaline matter.

* In my ſecond letter to Dr. SAUNDERS, on the red Peruvian bark.

The nauſeous taſte of rhubarb ſeems to ariſe from a ſweet combined with a bitter, and affords room to believe, that it contains a ſaccharine matter, which probably might be obtained in a ſeparate ſtate by a ſuitable chemical proceſs. Accordingly, I find the celebrated M. SHEELE, a German chemiſt, is ſaid lately to have ſucceeded in obtaining from it a ſalt conſiſting of the ſaccharine acid united to an earth; and M. MODEL aſſerts, that rhubarb contains this ſelenetic matter to the amount of one-tenth of its weight.

How imperfect is our knowledge concerning the conſtituent parts of vegetables, and even of thoſe vegetables with which we are the moſt familiar! Whence it would ſeem adviſeable, in order to have their virtues entire, that we ſhould give them in ſubſtance, the form in which nature preſents them, rather than in infuſion or tincture. This at leaſt ſeems evident with reſpect to the drug now under conſideration.

My learned Friend the DEAN of GLOCESTER, in a late converſation on this ſubject, having dropt a hint that the ſeeds of rhubarb might probably deſerve attention, I was determined to try them. Accordingly Mr. RACK favoured me with a little parcel, of the ſame age as the roots of the Engliſh rhubarb, (viz. four years old) though not the produce of the ſame plants.

EXPERIMENT XIV. Twelve grains of the ſeeds reduced to powder, were given to a woman of fifty years of age in a glaſs of plain water. The powder cauſed a ſlight nauſea, and ſickneſs attended with gripes, and afterwards operated briſkly three times.

EXP. XV. The ſame quantity given to a middle-aged man, operated twice without producing theſe ſymptoms. The ſame perſon two days after took twenty grains, which operated four times in a gentle, eaſy manner.

Exp. XVI. A tincture was then drawn from ſixty grains of the ſeeds in two ounces of proof ſpirits. On filtering the tincture, it was found that the ſpirit had extracted only ten grains from the ſeeds; for the reſiduum left in the filter, when dried, weighed forty grains.

Exp. XVII. This tincture poſſeſſed the taſte, and other properties of rhubarb, and its aromatic quality was more predominant than in any of the tinctures drawn from the root. The aſtringent property, however, was manifeſtly leſs; for on adding the uſual quantity of a ſolution of martial vitriol, and writing with it, the ink appeared rather weaker, even than that of the reſiduum prepared from the root.

Exp. XVIII. Twenty grains of the powder of the ſeeds were given to another perſon of middle age, which operated briſkly three times; the urine in this, as well as the former caſes, was very ſlightly coloured. At the interval of two days, this experiment was repeated with the ſame effect.

Exp. XIX. The ſame perſon, at the like interval, took twenty grains of the reſiduum of the above-mentioned tincture, which operated alſo three times; but more gently than the powder.

Exp. XX. This experiment was likewiſe repeated within three days, and with ſimilar effect on another perſon.

REMARKS.

From theſe experiments it appears,

1ſt. That twelve grains of the ſeeds operate on ſome perſons nearly as much as twenty on others, though of the ſame age. On ſome, they act gently; on others, more roughly: ſuch is the difference of conſtitution. Hence the neceſſity of repeating the experiments on ſeveral ſubjects, before the effects of this or any other drug can be ſatisfactorily aſcertained. In general, it would ſeem to appear that

that twenty grains of the ſeeds are adequate to thirty of the root, as to the purgative power.

2*dly*. That the reſiduum of the ſeeds is nearly equal in this reſpect to their powder, according to what was diſcovered concerning the reſiduum of the root; but here the proof ſpirit extracted leſs from the ſeeds, than from the root by way of tincture.

3*dly*. That the ſeeds appear to be more aromatic than the root, but to contain leſs aſtringency than even its reſiduum, when treated in the ſame manner.

Some writers alledge, that the diſtilled water of rhubarb contains a purgative quality. But this merits farther confirmation, and at the ſame time ſuggeſts ſome additional experiments to thoſe whoſe curioſity may prompt them to proſecute the ſubject, which is ſtill far from being exhauſted. The chemical and medicinal properties of the diſtilled water, and of the reſiduum; the elaſtic fluid extricated by diſtillation; the eſſential ſalt, and the aſtringent principle, may all afford further novelties worthy the attention of a curious obſerver, and perhaps throw new light on the hidden qualities of this important drug.

I have the honour to be, &c.

A. FOTHERGILL.

BATH, *Feb*. 10, 1785.

Opinions on the Virtues and Quality of the Engliſh Rhubarbs, in Letters from different Medical Gentlemen.

LETTER I.

[From J. C. LETTSOM, F. R. S. and S. A.]

SIR,

THE roots of rheum palmatum ſent to me from Bath I carefully examined: in colour and grain they reſembled the beſt Turkey rhubarb in the ſhops, with the ſame grittineſs and taſte in chewing; but with the difference of being more mucilaginous, probably owing to the circumſtances of age and degree of dryneſs. In theſe reſpects, however, I could not clearly diſcover any difference in the two ſpecimens. They were carefully dried and powdered, with a view to aſcertain their medicinal qualities from experiment.

By the occaſional uſe of Turkey rhubarb, I had pretty well acquired the knowledge of its operation on myſelf, in a doſe of ten grains, which affords one evacuation. I took ten grains of the ſpecimen marked No. I. and ſo far as I could judge, the effect was preciſely what I might expect from the ſame quantity of Turkey rhubarb.

About a week afterwards, I purpoſed to take the ſame doſe of the ſpecimen marked No. II. but ſome circumſtances of immediate attention having occurred, I did not execute my attention. On that night, however, I ſuffered an unuſual degree of pain of the abdomen, without knowing any cauſe for ſuch an event, having enjoyed for many preceding months, as well as ſince, the moſt uninterrupted health.

I mention

I mention this circumſtance to ſhew, how cautious we ought to be in drawing concluſions from a ſolitary fact; for had I taken the rhubarb as firſt propoſed, I might have aſcribed the unuſual pain to this vegetable.

On the ſubſequent night I took it: it excited no pain or inconvenience, and produced an effect, though leſs than from No. I. I do not hence conclude, that No. II. was weaker, for whatever purgative medicine we give, it is obſervable, that the firſt doſe acts more powerfully than the ſubſequent ones, either from habit diminiſhing the ſtimulus, or from leſs ſordes remaining after the firſt exhibition of ſuch remedies; as ſnuff by uſe loſes its ſtimulus on the olfactory nerves.

It might ſeem a very natural inference, that a medical perſon is the beſt judge of the effects of medicine, by experiments made on himſelf; but this may be doubted, as his imagination may be more forcibly directed to fancy thoſe effects, which its knowledge induces him to ſuſpect. We have remarkable proofs in point, in many medical books, whoſe authors have related effects of remedies, which none but themſelves could diſcover. To explain this by a recent inſtance: the late celebrated Dr. STORCK, who wrote upon the diuretic effects of the Colchicum Autumnale, fancied he could feel its ſtimulus on the ſecretory organs of urine, and its almoſt immediate increaſe of that ſecretion; which numerous experiments ſince have clearly proved to have depended upon the ardour of imagination.

This led me to try the rhubarb, where imagination could not operate. I ordered it in about forty inſtances to children from one to three years of age; I never knew it to produce any griping that was perceptible; it anſwered as effectually, or nearly ſo, as the beſt Turkey, ſo far as I could

aſcertain by particular attention and enquiry; as many of theſe trials were made on my own children. I conclude, however, that although the ſame effects were produced, the foreign vegetable ſeems to be rather more active than the Engliſh rheum palmatum, in perhaps the proportion of one-third at the utmoſt.

To ſum up my opinion: I conclude, that the exotic plant poſſeſſes no one quality which the other does not contain; that they are the ſame production; and that, probably, the ſuperior activity of the former may depend on circumſtances of ſoil, time of taking up the roots, their age, and the methods of drying, which future enquiries may doubtleſs determine.

From ſome obſervations that have occurred to me, I ſuſpect that young plants have more mucilage, and leſs of an active reſin, than old ones; but at what particular period to fix the propereſt age for medicinal uſe, my obſervations do not warrant me to decide.

With regard to the two ſpecimens of the Engliſh rheum palmatum marked No. I. and II. I find it difficult to give the preference. I rather prefer, however, that marked No. I.

J. C. LETTSOM.

LONDON, *Oct.* 29, 1784.

LETTER

LETTER II.

[From Dr. HOPE, Edinburgh.]

SIR,

THIS day I received your letter of the 11th of March, with two parcels of rhubarb.

Your learned and well-informed Society know, that the rhubarb which we receive through Ruſſia, formerly called the Turkey rhubarb, is the root of the rheum palmatum, and different from the rhubarb received from China: we have been in poſſeſſion of this ſpecies of rhubarb above twenty years.

Moſt of the apothecaries here uſe no other than what is raiſed in Scotland. For ſeveral years there has been no other uſed in the Royal Infirmary. *When a ſound root of this is well dried, and properly dreſſed, it is in* NO *reſpect inferior to what comes from Ruſſia.* The point therefore before me is, the ſtate of preſervation of the two parcels ſent, of which I ſhall give you my opinion without reſerve.

I beg leave to premiſe, that as your letter is dated the 11th of March, the roots, from having lain in damp places, and from other cauſes, may have ſuffered.

The parcel No. I. conſiſted of two pieces of roots of a moderate ſize. I cut each into four parts, by croſs inciſions; one of them was the crown of the root, and evidently unſound in the heart, though not to any great degree; the other was ſound throughout.

No. II. conſiſted of a ſmall branch, which was ſoft, flexible, and not ſufficiently dried, and of a larger piece of the body of

of the root. Upon cutting it into four pieces, I was ſorry to find it unſound in the heart; in place of its natural beautiful nutmeg or marbled appearance, I found it brown, and ſlightly tinged with black, and ſoftiſh in the heart; the reſt of this piece was ſound and good, except a little under the bark, which was diſcoloured. None of the four pieces were externally dreſſed, and therefore not marketable.

Although No. I. ſeemed to me to be more fully dried, and better dried, than No. II. it would be raſh to extend this opinion to the reſt of the parcels. It is proper to add, that none of the pieces were ſo unſound, as, in my opinion, to injure their medicinal qualities: but three of the four pieces would not keep; the moiſture and unſoundneſs would have extended, and ſpoiled more of the root.

On the ſubject of rhubarb, I have thought much, and made many experiments, and received much uſeful information: after all, it is a very difficult and uncertain attempt to dry rhubarb ſucceſsfully.

It gives me great pleaſure to ſee Societies of Agriculture eſtabliſhed in different parts of England. If I thought it would be acceptable to your Society, I ſhould tranſmit to you what a long experience has taught me. Would it be acceptable to the Society to have a few ſeeds of the aſafœtida plant, which is hardy? There are but four plants of it in Europe: two in this garden, and two in the King's garden at Kew, from ſeeds which I ſent Mr. AYTON two years ago.

I am, Sir, your obedient ſervant,

JOHN HOPE.

P. S. As

P. S. As the Society ſeem deſirous to have the opinion of the beſt judges of home rhubarb, on the parcels claiming the premium, I tranſmitted the two parcels you ſent me to Sir ALEXANDER DICK, and ſend incloſed his anſwer.

EDINBURGH, *July* 17, 1784.

LETTER III.

[From Sir ALEXANDER DICK, to Dr. HOPE.]

DEAR DOCTOR,

I Got your letter, and ſpecimens of the rhubarb, with the Gentleman of Bath's letter to you, by your ſervant, yeſterday; and as I would not delay an anſwer to you in a matter of ſuch conſequence as my favourite ſubject of the true rhubarb's cultivation in Britain, and my thoughts of theſe two ſpecimens ſent you from Bath; I offer you my thoughts frankly, as to a brother of the College, though a ſuperior judge in this matter to myſelf.

I indeed think neither of the two ſpecimens you ſent me are correctly dried, nor cured to advantage, either for medicinal uſes, or commerce. You do not ſee prevailing over the pieces you ſent me, the nutmeg-looking grain in theſe roots, ſuch as has a ſimilarity to the colour of the flower of the plant when in its perfection, which I aſcribe either to the roots not being of ſufficient age; (that is, five or ſix years at leaſt) or what my gardener (the bearer) ſuſpects, the roots have been too gradually dried, and not in a place ſufficiently well aired and warm in a proper degree, conſequently

ſequently have ſuffered by ſome damp and mouldineſs. He brings for your inſpection ſome pieces of mine, five or ſix years old, and ſome of laſt year's drying, and ſome which the Society of Arts in London returned of mine, trimmed by their order, and approved of.

I ever am, yours,

ALEXANDER DICK.

PRESTONFIELD, *July* 20, 1784.

LETTER IV.

[From Dr. CUMING, Dorcheſter, to the Secretary.]

SIR,

ABOUT the 26th of March laſt, I was favoured with your letter of the 10th of the ſame month, accompanying two ſpecimens of rhubarb root of Britiſh growth, and requeſting my opinion, upon trial, of its qualities and efficacy, compared with that imported from Turkey.

That I might be able to give the Society ſome information, and likewiſe to ſatisfy myſelf as to its comparative merit, I immediately diſtributed ſmall parcels of what you ſent me to ſome apothecaries in this place, diſtinguiſhing them by No. I. and No. II. as you had done; I alſo ſent a piece of each ſort to an eminent phyſician in this county. The accounts from the apothecaries are too vague and uncertain to be repeated, as the trials were not made with ſufficient accuracy: but I am informed by my friend the phyſician, that he gave a piece of No. I. to a lady, who was in the

the practice of chewing rhubarb occaſionally; ſhe reported to him, that ſhe found it anſwer perfectly well, and in the ſame doſe as that which ſhe had from the ſhops. The trial which I made upon myſelf was, I think, not quite ſo favourable, as it required three parts of No. I. to produce the ſame effect on me, as two parts of the Turkey rhubarb uſually did, though they both operated with equal eaſe; and No. II. I think is inferior in ſtrength to No. I.

I am ſorry, Sir, to be obliged to ſend you an account ſo lame and unſatisfactory, yet it is the beſt that I can at preſent furniſh. I hope you will receive more deciſive intelligence from the numerous practitioners at Bath, and ſhall be glad to learn that the efficacy of Britiſh rhubarb is found to be equal to that from Turkey.

I had a rhubarb root ſent me laſt autumn, ſaid to be that of the *rheum palmatum*, but was greatly diſappointed by ſeeing it, in the ſpring or beginning of ſummer, ſhoot out large, round, entire leaves, ſimilar to thoſe of the *rhaponticum*, which I believe it to be. Can you inform me if the leaves of the *rheum palmatum* are digitated or palmated, the very firſt year after being tranſplanted? Or may we expect that theſe entire round leaves will in a ſucceeding year aſſume a palmated form?

With my ſincere wiſhes for the proſperity of the Society, and for the continuance of your health,

I remain, Sir,

Your obedient humble ſervant,

W. CUMING.

DORCHESTER, *Aug.* 14, 1784.

LETTER

LETTER V.

[From Meſſrs. CLARKE, JACAM, and CLARKE, Druggiſts, in London.]

SIR,

WE have deferred giving you our opinion on the two ſpecimens of rhubarb ſent to us by the Bath Society, wiſhing to join ſome phyſical obſervations to our own as druggiſts, thinking it a ſubject that required much nicety and attention.

The ſpecimen No. I. appears to be not of the true rhubarb; it abounds more in gummy matter than reſinous, therefore, as a purgative, is much weaker than either the Indian, Ruſſian, or Scotch. Its texture is more lax and ſpongy than any rhubarb we ever ſaw, and its colour lighter. The grain in ſome parts is beautiful; but it does not communicate to the taſte that warmth and bitterneſs which is always found in the other rhubarbs. Its ſmell is very ſingular, not in the leaſt reſembling rhubarb; it is beſides imperfectly dried. It has been given in the uſual quantity of a doſe without any ſenſible effect.

The ſpecimen No. II. appears to be of the true rhubarb, but we think not produced from the Ruſſian ſeed. Its ſmell, taſte, and effect, correſpond in ſome degree with the foreign rhubarbs, only it is weaker, and the grain very indifferent. This has alſo been imperfectly cured, and we apprehend not taken up at a proper age. Of the two ſpecimens, we certainly give the preference to this, though think it inferior to the foreign rhubarbs.

We

We have ſent for your inſpection two ſpecimens of ſome raiſed in Scotland on the eſtate of the Duke of Athol, which are produced from the *true* Siberian ſeed. The Duke ſent us ſome the ſame as the ſpecimen No. II. laſt year, upon which we took the opinion of ſome gentlemen of the firſt eminence in the profeſſion, (the ſame with whom we have conſulted reſpecting yours;) they agreed, that it was nearly if not quite equal to the Ruſſian, in ſmell, taſte, and effect, but thought, by paying a little more attention to the curing of it, its beauty might be increaſed. We repreſented this to the Duke, and he has now ſent us a ſpecimen (of which No. I. is a part) of what we are to have in future. As yet we have not received any of it for ſale; but of No. II. have ſold a large quantity, which has been generally approved by the gentlemen who have uſed it.

We hope this account will prove ſatisfactory to the Gentlemen of the Society: ſhould they wiſh any further trials to be made, and can favour us with any larger ſpecimens, we will get them uſed in every form of pharmacy, and the different menſtrua.

We ſhall always be ready to give the Gentlemen our ſentiments on any ſubject that may come before them, which relates to our line of buſineſs.

We have the honour to remain, Sir,

Your obedient humble ſervants,

CLARKE, JACAM, and CLARKE.

LONDON, *May* 1, 1784.

LETTER

LETTER VI.

[From Mr. R. C. Sims, Dunmow, Eſſex.]

TO inveſtigate the medical properties and powers of rhubarb of Engliſh growth, and to determine the proportion of its ſtrength to that of the Turkey and Eaſt-Indian ſort, with any degree of accuracy, is a nice and difficult point. It requires the conſideration of the differences which may occur in the ſpecimens themſelves, in the conſtitution and preſent ſtate of the ſtomach and bowels of the perſons taking it, and in the ſeaſon, and other incidental cauſes of difference. Many of theſe circumſtances are obſcure enough to eſcape or baffle the obſervation of a diligent enquirer; and yet ſo efficacious in changing and determining the medical powers of a medicine, as to cauſe the ſame drug to produce very different effects in different perſons, or even in the ſame perſon on different trials; and at another time to cauſe two drugs, of different medical powers, to produce effects nearly ſimilar: therefore nothing leſs than a variety of different trials, repeated by different perſons for a length of time, can eſtabliſh certainty in this caſe. It would be wrong to amuſe with crude experiments. Therefore all I can now ſay is, that the ſample No. I. appears the beſt of the two, and to reſemble the foreign in colour, flavour, and grain, more than No. II.

Both ſamples conſiſt of a larger and a ſmaller piece: the larger cut flat, and the ſmaller cylindrical, or a fragment. A drachm of each piece, and of Turkey, and good Eaſt-Indian rhubarb, each freſh powdered, and placed on a ſeparate piece of paper, ranged, when compared with reſpect to deepneſs of colour, in the following order: 1ſt, The flat piece of No. II. by far the paleſt. 2d, The cylindrical

lindrical piece of the ſame ſample, much higher coloured. 3d, The cylindrical piece of No. I. 4th, Eaſt-Indian. 5th, The flat piece of No. I. 6th, Turkey, the deepeſt yellow of any.

The rhubarb taſte and aſtringency of the ſamples ſeemed proportioned to the colour. The flat piece of No. II. cut very pale; and in powder was not yellower than the powder of the flat piece of No. I. when ground with double its weight of ſtarch. Infuſed cold, it gave very little colour to water, but to proof ſpirit a colour equal to that of the flat piece of No. I. At the ſame time the cylindrical piece of the ſame ſample No. II. gave both to water and proof ſpirit a higher tincture than even the flat piece of No. I. or either of the foreign rhubarbs. I am not qualified to ſpeak of the comparative ſtrength of the medical powers of Engliſh and of foreign rhubarb: Nor do I know of any quality in the Engliſh that is inimical to health.

From the examination I have made of this rhubarb, I have no reaſon to apprehend any bad effect from its uſe: But my experience is not ſufficient to warrant me to think it right to adminiſter it in the general courſe of my practice. In all delicate caſes, experiments ought to be made with the greateſt caution, and even jealouſy.

R. C. SIMS.

DUNMOW, 13*th of the* 8*th Month*, 1784.

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INTRO-

INTRODUCTION.

THE very favourable reception which the two former Volumes of Select Papers met with, has induced the Society to lay a *Third* Volume before the Publick, which they truſt will be found in no reſpect leſs intereſting.

For this they are happy in acknowledging their obligations to many reſpectable Correſpondents, who, by their valuable communications, have given the ſtrongeſt proof that the exertions of the Bath Society to promote the intereſts of Agriculture, and the uſeful Arts, have met with their approbation.

In reviſing the following Letters for the Preſs, ſuch parts as were complimentary to the

APPENDIX:

CONTAINING AN ACCOUNT OF

EXPERIMENTS

ON

ENGLISH RHUBARB,

BY

DRS. FALCONER, PARRY, AND FOTHERGILL.

WITH

THE OPINIONS OF SEVERAL OTHER MEDICAL GENTLEMEN ON ITS QUALITY AND VIRTUES.

Examination of two Parcels of Engliſh Rhubarb, marked No. I. *and No.* II. *ſent to the Agricultural Society at Bath, in conſequence of their Advertiſement for a Premium, relative to the raiſing that Drug in perfection in this Country.*

By W. FALCONER, M. D. F. R. S. Phyſician to the General Hoſpital;

And C. H. PARRY, M. D. Phyſician to the Pauper Charity, Bath.

THE ſpecimens of rhubarb No. I. and No. II. were both in a rude ſtate, being ſimply cut in a tranſverſe direction into pieces of various thickneſs. Some of the pieces had holes bored through the center, but the greater part had not. The bark was, we believe, ſtripped off, but no farther dreſſing was attempted; conſequently, the outſide was irregular and unſightly. The center parts of many pieces were alſo in a ſoft, and rather decaying ſtate. The pieces varied much in ſize, being from about three-quarters of an inch to four inches or more in diameter.

When broken, they appeared in general brittle, but moderately dry, firm, and ſolid; of a woody contexture, and not hard, flinty, or horny, though ſome of the leſſer pieces ſeemed to be inclining to theſe qualities. In colour, they were of a whitiſh ground, with numerous red ſtreaks, reſembling the inſide of a nutmeg; but ſmaller and cloſer placed. No. I. in this reſpect, ſeemed ſuperior to No. II. in general; but this was not an univerſal remark, as one piece which we chanced to ſelect of No. II. was equal, if not ſuperior, to any of No. I. which we examined. When chewed, the taſte of each was nearly alike, being in both bitter

bitter and aſtringent, and reſembling the peculiar flavour of good rhubarb. They alſo tinged the ſaliva of a deep yellowiſh red colour. The ſmell of each was pleaſant and aromatic, though but in a ſmall degree. No. I. in general had all theſe qualities in a ſomewhat ſuperior degree to No. II. The internal ſtructure of ſome of the beſt pieces when broken was ſcarcely diſcernible from that of Turkey rhubarb, and No. I. in general (in this reſpect) approached the neareſt: but both were, we think, ſuperior to the Eaſt-Indian, which inclined rather to a brick colour; whereas the others were rather of a crimſon hue.—They were both reduced to powder with ſufficient eaſe, but No. I. rather the eaſier of the two, and ſcarcely differing in facility of pulverization from the Turkey rhubarb. When powdered, No. I. was moſt ſimilar to Turkey rhubarb in colour, being a tolerably bright and fair yellow; whereas No. II. was paler and more dull, one ſpecimen only excepted, before referred to.

In taſte, No. I. was ſuperior to No. II. both in aromatic flavour, and alſo in ſenſible aſtringency. No. II. ſeemed, however, to have a flavour full as delicate as the Eaſt-Indian rhubarb.

The ſpecifick gravity of the four different kinds of rhubarb was as follows, with regard to diſtilled water of ſixty-two degrees of temperature:—

Eaſt-Indian	—	—	1,046 to 1,000
Engliſh Rhubarb, No. II.		—	1,005
Turkey Rhubarb	—	—	,829
Engliſh Rhubarb, No. I.		—	,792

EXPERIMENT I. An ounce troy weight of the rhubarbs No. I. No. II. and of fine Turkey rhubarb, all in fine powders, were ſeverally

ſeverally put into braſs ſhallow pans, with twenty-four ounces by meaſure of ſpring water to each. Theſe were ſeverally evaporated by ſlow boiling to ſixteen ounces each, and were then ſtrained through a piece of coarſe muſlin. The colour of each of the ſtrained liquors was as follows:—

No. I. a dark reddiſh brown.

No. II. much the ſame hue, but darker.

The Turkey rhubarb was more of a red tinge, and lighteſt coloured of any, and had the moſt aromatic ſcent. No. I. ſeemed to be next in degree to the Turkey.

Exp. II. Half an ounce of Eaſt-Indian rhubarb in powder, (being all we had then in our poſſeſſion) was treated in the ſame manner as thoſe before mentioned; only with half the quantity of water, which was boiled down in the ſame proportion. The infuſion nearly reſembled the others, ſave that it was of a deeper colour. That of the Turkey rhubarb was in taſte the moſt bitter and aromatic of any; the Eaſt-Indian and No. I. were the moſt aſtringent; and No. II. weakeſt in all reſpects. The aromatic flavour was however greatly diminiſhed in all of them by boiling. The precipitation at the bottom of the infuſion of Turkey rhubarb, that ſubſided on cooling, was conſiderably larger than any of the others. All the infuſions, when cold, were to appearance equally turbid.

Exp. III. Six ounces by meaſure of the infuſions of No. I. No. II. and of the Turkey rhubarb, and three ounces of the infuſion of the Eaſt-Indian, were put two days after the firſt experiment into braſs pans, the ſame as uſed in Experiment I. and evaporated to a thick ſyrup conſiſtence, and poured ſeparately into earthen ſaucers. The colour of them all whilſt fluid varied little one from the other, being of a dark clear reddiſh brown. The taſte of them all was ſtrongly bitter, but with little aromatic flavour. The extract from the Turkey rhubarb ſeemed to retain

moſt of the aromatic taſte. The next in degree was No. I.—No. II. and the Eaſt-Indian were nearly alike.

When become dry and hard, as all the extracts were in a few days, thoſe of the Turkey and Eaſt-Indian rhubarbs aſſumed a clear gloſſy ſurface. No. I. was rough, but rather ſhining; and No. II. rough and duſky. In point of conſiſtence, thoſe of the Turkey and Eaſt-Indian rhubarbs were extremely brittle, and broke into clear gloſſy ſmall pieces; that of No. I. had a conſiderable degree of tenacity; and No. II. ſtill more of that quality.

Exp. IV. Nine grains of the above four extracts, accurately weighed, were put into four ſeparate tea-cups, and half an ounce by meaſure of rectified ſpirits of wine poured upon each; after ſtanding ſix hours, the ſpirits were tinged of a deep yellow colour, darkeſt in the Eaſt-Indian; next in the Turkey, next in No. I.; and No. II. the paleſt of any. The ſpirits were then poured off from all, and the ſame quantity of freſh ſpirits added, which was repeated five times, at the end of each of which the ſpirits in all of them were coloured in the order above deſcribed, but much paler than at firſt. The reſidua from each were then collected carefully and dried; they were all rather ſlimy, and mucilaginous in the mouth, and ſoluble in the ſaliva, and had but little taſte of any kind. No. I. was of a pale yellow colour and brittle texture, and weighed one grain and three quarters. The Turkey rhubarb was of rather a darker colour in general, though intermixed with ſome of a paler hue, and weighed the ſame as No. I. —No. II. was of a lighter colour, and weighed two grains and three-quarters.—The Eaſt-Indian reſembled the Turkey, and weighed one grain.

Exp. V. Three drachms of the four kinds of rhubarb mentioned above, were ſeverally put into four ounces of rectified ſpirits of wine, and corked up; after ſeveral days ſtanding they were filtered. The Eaſt-Indian rhubarb had acquired a dark yellowiſh red colour. No. I. and the Turkey had a ſimilar tinge, but lighter; and differing but little from one another. No. II. was of a ſimilar hue, but lighter ſtill.

Exp. VI.

Exp. VI. Two ounces by meaſure of each of the above tinctures were ſeverally poured into earthen-ware ſaucers, and ſlowly evaporated to a moderately hard conſiſtence. The colour of the reſiduum was nearly alike in all, being a yellowiſh red, brighter than the watery extract. The taſte in all was bitteriſh, and conſiderably aſtringent; moſt ſo in the Eaſt-Indian; next in the Turkey; next in No. I.; and No. II. leaſt of any. That of No. I. weighed thirty-two grains; that of No. II. eighteen grains; that of the Turkey rhubarb forty-three grains; and the Eaſt-Indian rhubarb thirty-eight grains.

N. B. They all attracted moiſture from the air, ſo as to ſoften in ſome degree on ſtanding.

Exp. VII. A tincture of the four kinds of rhubarb was made, in the proportion of an ounce to a pint of brandy, but without the addition of any other ingredient. The colour ſcarcely differed from that in rectified ſpirits. The Turkey and the Eaſt-Indian were ſo nearly alike, as ſcarcely to be diſcernible one from the other, being both of a dark yellowiſh red. No. I. was the next in intenſeneſs of colour; and No. II. the paleſt of any.

Exp. VIII. Four ſlips of card paſteboard were ſeverally dipt in the watery infuſions deſcribed in Experiment I. and ſuffered to dry. The Turkey rhubarb gave the deepeſt yellow colour; the next was the Eaſt-Indian; the next No. I.; and No. II. was the paleſt of any.

Exp. IX. Four ſlips of white paſteboard were dipped into the tinctures in rectified ſpirits mentioned in Experiment V. and ſuffered to dry. The Eaſt-Indian rhubarb gave the deepeſt colour; next to that the Turkey; next was No. I.; and No. II. the paleſt of any.

Exp. X. The ſame experiment was made with the tinctures in brandy mentioned in Experiment VII. The Turkey rhubarb gave the deepeſt colour; next the Eaſt-Indian; next No. I.; and No. II. was the paleſt of any.

Exp. XI.

Exp. XI. Two ſcruples of green vitriol were diſſolved in ſix ounces of ſpring water; of this ſolution twenty drops were reſpectively put into four wine glaſſes, each containing an ounce by meaſure of ſpring water. To each of theſe was put reſpectively one drachm by meaſure of the ſeveral infuſions of rhubarb mentioned in Experiment I. A black or dark brown colour was preſently produced in all of them, ſo deep as to obſcure the tranſparency of the liquors, and of courſe prevent any juſt compariſon. A clean pen was dipped into each, and ſome words written therewith on a card; thoſe written with that wherein the infuſion of the Eaſt-Indian rhubarb had been put, were the darkeſt coloured. No. I. and the Turkey were nearly alike: and No. II. conſiderably the paleſt.

Exp. XII. The ſame experiment was repeated, ſave that inſtead of one drachm of the watery infuſion, one drachm of the tincture in rectified ſpirits was ſubſtituted. They all became in a ſhort time ſo black, as to obſcure all diſtinction. A pen was therefore dipped into each of them, and words written upon a white piece of card paſteboard as in the laſt Experiment. The Turkey rhubarb gave the deepeſt colour; next to that the Eaſt-Indian; next No. I.; and No. II. the paleſt of any.

Experiments with the Rhubarbs, No. I. *and No.* II. *made at the General Hoſpital, by Mr.* Farnell, *the Apothecary; a very ſenſible, accurate, and well-informed Perſon.*

Case I.

JAMES JENKINS, aged 33, afflicted with a paralytic affection of his lower extremities, and an involuntary diſcharge of urine, took of the powder No. II. half a drachm, in two ounces of ſimple peppermint water, at ſeven in the morning; it produced four evacuations about ſix hours after, and operated without griping.

The

The ſame perſon, ſome time after, complained of a pain in his ſtomach, which continued the whole day, and prevented his taking food. At bed-time he took fifteen grains of No. II. his pain abated, and he lay eaſy all night, and had one lax motion next day.

CASE II. John Deane, aged 54, troubled with a rheumatick diſorder in his ſtomach and limbs, took half a drachm of No. II. which produced three motions about ſeven hours after being taken, and without griping.

A fortnight after the ſame perſon, being taken with a pain in his ſtomach, took a gentle emetick; and the next day complaining of a gnawing pain in his ſtomach, took one ſcruple of the rhubarb No. I. in two ounces of ſimple peppermint water; this gave eaſe, but produced one operation only; he ſaid that it warmed his ſtomach and limbs very much.

CASE III. James Elliot, aged 23, afflicted with a violent pain in his hip, and a general weakneſs of body, took half a drachm of powder of rhubarb, No. II. in ſimple peppermint water; after being taken four hours, it operated three times without griping.

CASE IV. William Symonds, aged 45, afflicted with pains in his limbs, attended with ſwellings of the joints, took half a drachm of No. II. as above, in ſimple peppermint water: it operated five times in about four hours after being taken, with a little griping.

CASE V. Thomas Shaw, aged 31, afflicted with rheumatick pains, and of a ſcorbutick habit, took half a drachm of the powder No. II. in ſimple peppermint water: it operated three times ſix hours after being taken, without griping.

CASE VI. Elizabeth Roberts, aged 24, afflicted with rheumatick pains, took half a drachm as above of No. II. it operated twice in twelve hours after being taken, with a little griping.

CASE VII.

CASE VII. John Way, aged 60, afflicted with rheumatick pains and trembling in his hands, took half a drachm of No. II. it operated four times in eight hours, and without griping.

CASE VIII. Jeremiah Norris, aged 50, afflicted with a paralytick diſorder, took half a drachm of No. I. in two ounces of ſimple peppermint water: It did not operate for twelve hours after being taken, and then once only that day, and once the next, with much griping. He ſaid, however, that his body was difficult to be operated upon by purgatives.

CASE IX. W. French, aged 30, of a weak habit of body, was taken with a vomiting and purging; he took ten grains of the rhubarb No. I. which checked it; he lay eaſy all night, and his complaint ceaſed.

CASE X. Grace Herbert, aged 20, a leprous patient, was ſeized with a purging after bathing: half a ſcruple of No. II. in ſimple peppermint water was given, which checked it, and ſhe continued well.

CASE XI. Francis Green, aged 40, afflicted with a paralytick complaint of his lower extremities, took half a drachm of No. II. in ſimple peppermint water; he being eaſy to work, it operated ſix times in eight hours after being taken, and without griping.

CASE XII. W. Golding, aged 23, afflicted with a pain in his right hip, took half a drachm of powder of rhubarb, No. II. in ſimple peppermint water; it griped him much, and operated but twice that day: he had one motion the next day, but not a lax one.

N. B. None of the above perſons were very robuſt, nor were any confined to their beds. Their urine on the day of taking it was tinged of a yellow colour, as is cuſtomary on taking the other kinds of rhubarb. The patients did not complain of much ſickneſs.

The

The following Experiments were alſo made in the General Hoſpital, by Mr. FARNELL, *with the Engliſh Rhubarb, No.* I.

CASE XIII. Sarah Rogers, aged 50, labouring under a leprous complaint of the moiſt kind, took half a drachm of the rhubarb, with two ounces of ſimple peppermint water, at ſeven o'clock in the morning; it procured two motions about nine o'clock in the evening. A little ſickneſs, and griping pains, continued the whole day. No ſtool for two days after.

CASE XIV. Peter Philips, aged 23, labouring under a leproſy of the dry kind, took two ſcruples of the powder as above; it procured three motions by ſix o'clock in the evening, without ſickneſs or griping, and he had a ſtool next day as uſual.

CASE XV. Wm. Young, aged 12, afflicted with a paralytick complaint, attended with an incontinency of urine, took half a drachm as above; it procured four ſtools by three o'clock in the afternoon, no complaint in the ſtomach or bowels attended its operation; had a ſtool next day; brought off a great deal of water.

CASE XVI. John Green, aged 3, afflicted with a paralytick complaint, took twelve grains in a little ſyrup of roſes; it operated three times that day, and twice the next day.

CASE XVII. Philip Lodge, aged 50, leprous, took two ſcruples as above; it operated four times, without any complaint; had a ſtool the next day.

CASE XVIII. Ann Johnſon, aged 25, afflicted with rheumatick pains, took half a drachm as before; it operated twice in the evening, with a little ſickneſs and griping; no ſtool for two days after.

CASE XIX. Mary Farrier, aged 30, afflicted with rheumatick pains, and weakneſs of her bowels, took half a drachm, as before; it operated twice in the evening without any complaint; had a ſtool the next day.

CASE XX.

CASE XX. James Creedy, aged 40, great weakneſs of his lower limbs, and a weakneſs of his bowels, took half a drachm as before; it operated three times by nine in the evening, without any complaint; had no ſtool for two days after.

CASE XXI. Eliz. Frampton, aged 36, afflicted with pains in her thighs, and a laxity of her bowels, took a ſcruple, as before; it procured two ſtools in the evening, without any complaint; ſhe was very open the next day, and at times is too much ſo; takes half a ſcruple at bed-time, which at intervals, with a drachm of elixir paregoric, anſwers very well, keeping her eaſy all night.

CASE XXII. John Blandy, aged 25, leprous, took 50 grains as before; it operated twice in the evening, without much complaint; had no ſtool for two days after.

CASE XXIII. Sarah Howley, aged 8, paralytick weakneſs of her left ſide, from fits, took twenty-five grains in ſimple mint-water; it operated three times by five o'clock P. M. without any ſickneſs; had no ſtool for two days after.

CASE XXIV. Judith Wyard, aged 28, afflicted with rheumatick pains, and loſs of the uſe of her lower limbs, took two ſcruples as before; it operated twice the next day, with much griping; took two ſcruples more that morning before it operated. —She mentioned after, that ſhe ſeldom has a ſtool oftener than once a week.

CASE XXV. Joſeph White, aged 14, general rheumatiſm, took two ſcruples as before, it operated three times that evening, with a little griping; had a motion the next day as uſual.

CASE XXVI. Sarah Webley, aged 28, general rheumatiſm, took two ſcruples as before; it operated three times that afternoon, without any ſickneſs, but a little griping; had no ſtool for three days afterwards, till the above was repeated.

CASE XXVII. Margaret Land, aged 34, general rheumatiſm, took two ſcruples as before; it operated twice in the afternoon, with ſickneſs and griping pains; had a ſtool next morning.

CASE XXVIII.

CASE XXVIII. Mary Sherry, aged 40, afflicted with violent pain in her bowels, with ſickneſs and acidities in the ſtomach, took two ſcruples of the pulv. rhæi Ang. with ſix grains of ſal abſinth. in ſimple peppermint water; it operated four times that day, with very little ſickneſs or pain; had a ſtool the next day.

CASE XXIX. Eliz. Pearce, aged 36, afflicted with rheumatick gout, took two ſcruples, as before, joined with half a ſcruple of ſpic. aromatic; it operated three times that day without any complaint; had no ſtool for two days after.

Several patients have been at times afflicted with ſlight purgings, and by taking fifteen grains or a ſcruple of the pulv. rhæi Anglic. in ſimple mint water, with the addition of one drachm of paregorick elixir, or fifteen drops of thebaick tincture, at bed-time, have been much relieved; ſooner with the opiate than without it, they being eaſy all night, and in general a motion being produced the next day.

Remarks upon, and Concluſions from the above Experiments.

[By Dr. FALCONER.]

THE two parcels of rhubarb, No. I. and No. II. appear, from the ſpecimens examined, to anſwer in external marks to the characters of good rhubarb: though unſightly on the outſide, their ſtructure, when broken, correſponded with thoſe marks which are eſteemed to indicate the perfection of the drug. The writers on the Materia Medica ſay, that good rhubarb ſhould be dry, firm, and ſolid, but not flinty or hard; eaſily pulveriſable, variegated on the inſide with numerous pale red ſtreaks, reſembling a nutmeg;* appearing, when powdered, of a bright yellow co-

* Carthuſer; Lewis Mat. Med.; Vogel. Mat. Medic.

lour, of a bitter aſtringent taſte, and peculiar flavour, with an aromatick quality, manifeſt to the ſmell as well as taſte.

All theſe qualities both the rhubarbs poſſeſſed in a tolerable degree; rather inferior in delicacy of taſte to the Turkey rhubarb, but ſuperior in ſome reſpects to the Eaſt-Indian: perhaps they might reſemble the Turkey rhubarb ſtill more nearly, had they been dug up as long a time, as rhubarb is ſaid to have its red colour improved by keeping. The careful ſelection of the beſt pieces only of the Ruſſian or Turkey rhubarb makes it appear to great advantage.

Vogel* relates, that an apothecary is ſent with the Ruſſian body of merchants that go to the borders of China, to purchaſe rhubarb, to whom all the rhubarb is delivered; who is ſtrictly ordered to ſelect carefully the beſt pieces only, and to burn all the decayed or bad. Upon the arrival of the rhubarb ſo ſelected, at Moſcow or Peterſburgh, it is again put into the hands of perſons ſkilled in pharmacy, who have the care of its being properly dreſſed and cleared of the hard, woody, decayed parts, and other excreſcences (as parts of the bark, &c.) that may remain; and to take particular care that no other kinds of rhubarb but the true be admitted: ſo that after all theſe cautions, none but the choiceſt and faireſt pieces can be exported.

From what has been mentioned in the above examination of Engliſh rhubarb, we ſee how much one piece of the ſame [illegible] may differ from another; ſo that a ſelection of the beſt pieces is indiſpenſibly neceſſary; and were this and ſome other circumſtances attended to, the Britiſh rhubarb

* Vogel, [illegible] advifes rhubarb to be kept ten years from the time of gathering it, before it is uſed.—*Eſſays to the Improvement of Phyſick.*

might,

might, for aught that appears to the contrary, equal any of the foreign.

Another precaution that appears highly neceſſary is, the cutting out the central part of every piece of the root. It is found by experience that the internal pieces, perhaps from their proximity to the ſap, are moiſteſt and moſt ſubject to decay, as was before obſerved about the Engliſh rhubarbs; and when any part comes into this ſtate, the infection ſoon ſpreads and damages the whole of the piece. It is doubtleſs, therefore, to avoid this, that the pieces of Ruſſian rhubarb have all holes (and thoſe pretty large) cut through their centre, which have been generally thought to have been made only to ſerve the purpoſe of hanging up, but appear to be for one material purpoſe beſides. Some of the beſt pieces of the Engliſh rhubarb had holes bored through them; one particularly of No. II. of which I have taken notice above; but theſe holes were not ſufficiently large to clear away the ſpongy and decaying parts: larger holes, therefore, are undoubtedly required.

Another defect in the ſpecimens of rhubarb above examined is, that the outſide is not ſcraped, or rather raſped, as the foreign rhubarbs are:—This not only gives it a ſhrivelled and mean appearance and colour, but is really of great diſſervice, by obſtructing the quickneſs of drying, from the pores not being laid open for the herbaceous moiſture to exhale. Though the bark be ſtripped off, the larger pores running moſtly longitudinally, do not open laterally, and of courſe the watery fluid is confined, and exſudes very ſlowly.

It is probable, that a great improvement might be made in the preparation of the Engliſh rhubarb, by accelerating its drying. It was formerly thought that plants were beſt

dried in a ſlow and gradual manner, which is now found to be a miſtake; and that as quick a drying as is conſiſtent with the ſafety of the vegetable ſubſtance, preſerves beſt the efficacious qualities of the plant.*

Too much light is indeed thought to do injury, as it impairs the colour, and perhaps (though even that is dubious) diſſipates ſome of the finer and more efficacious parts; but culinary heat is free from that objection, and at the ſame time poſſeſſes all the advantages of quick drying.

I have been lately informed by a gentleman of great experience in pharmacy, that the collectors of ſimples, about London, now furniſh dried herbs in infinitely greater perfection than formerly; their flavour, colour, and odour, being ſcarcely inferior to that of the freſh vegetable, which is owing entirely to their being quickly dried. The application of this hint to thoſe who raiſe and dreſs our indigenous rhubarb for the market, may be of ſervice.

The firſt and ſecond experiments ſhew the ſimilarity of the rhubarbs, No. I. and No. II. to the Turkey and Eaſt-Indian, as far as regards thoſe parts water is capable of diſſolving. The Turkey rhubarb, however, appears to contain the largeſt proportion of any, of matter ſoluble in water, and to retain moſt of an aromatick flavour.

The third and fourth experiments ſhew the proportion which the gummy, and perhaps inert, matter bears to the reſinous, and probably the more active. No. II. contains, according to experiment IV. the largeſt proportion of gum or mucilage, and the Eaſt-Indian the leaſt. No. I. and the Turkey were nearly alike; but I ſuſpect the reſin was

* Lewis's preface to his Mat. Medica.—New Diſpenſatory, 2d edit. p. 252.

not

not entirely extracted, though freſh ſpirits were five times poured on the reſidua, as it retained a dark colour to the laſt. The tenacity of the reſiduum of No. I. and No. II. and the brittleneſs and ſhining reſinous appearance of the Turkey and Eaſt-Indian reſidua, are ſtrong proofs of the two latter containing a larger proportion of reſin.

It is highly probable, that the reſin facilitates the ſolution of gum or mucilage in ſpirits, much as gum renders oils or reſins ſoluble in water. The ſolubility of ſome of the gum reſins, as aloes, aſafœtida, gum ammoniacum, &c. either in water or ſpirits, is a ſtrong preſumption in favour of this opinion. At any rate, theſe experiments rather tend to ſhew the ſuperiority of the foreign rhubarbs, as ſtomachick and aſtringent remedies; but I am not clear, if the larger proportion of mucilage with which the reſinous part of the Engliſh rhubarb is combined, may not render its operation as a purgative more eaſy. The reſin of jalap, which is ſo irritating when given alone, is rendered a ſafe and eaſy cathartick, by combining it with mucilaginous bodies.*

The fifth and ſixth experiments ſhew the different proportions of reſin contained in the ſeveral kinds of rhubarb. No. I. in this reſpect is far ſuperior to No. II. and the foreign rhubarbs are ſtill more abundant. It ſhould be obſerved, that the peculiar flavour and taſte of the rhubarb does not reſide in the reſinous parts, but probably in ſome eſſential oil ſtill more ſubtile. Though reſins and eſſential oils reſemble each other very ſtrongly, yet they are often found ſeparate. The peculiar flavour of the clove is contained in its eſſential oil; its acrimony in the reſinous part.†

The ſeventh experiment is made with brandy, in the ſame proportion with that uſed in the London pharma-

* Lewis's Mat. Med. Art. Jalapium.—New Diſpenſatory, p. 410.

† Lewis's Diſpenſatory, p. 360.

copœia.

copœia. The foreign rhubarbs ſeem in this, as well as in the foregoing experiments, to contain the largeſt proportion of active ſoluble matter.

The eighth, ninth, and tenth experiments, afford a more accurate examination of the colour of the rhubarbs in infuſion and tincture. The Turkey ſeems to poſſeſs the largeſt quantity of the colouring ingredient (which is certainly the reſinous part) ſoluble in water or brandy; and the Eaſt-Indian rhubarb, moſt of what is ſoluble in rectified ſpirits. No. II. was, in theſe as in the other experiments, the weakeſt of any.

Experiments XI. and XII. are intended to ſhew the various degrees of aſtringency poſſeſſed by the ſeveral rhubarbs, of which quality the precipitation of iron from an acid menſtruum in form of ink, is thought to be an accurate teſt.* The Eaſt-Indian rhubarb poſſeſſed this quality moſt ſtrongly in the watery infuſion; No. I. and the Turkey were nearly alike; and No. II. the weakeſt. In the ſpirituous tincture, the Turkey was the ſtrongeſt; next the Eaſt-Indian; next No. I.; and No. II. the weakeſt.

The experiments tried with the rhubarbs at the Bath Hoſpital ſhew, that both the portions of Engliſh rhubarb poſſeſs both the purgative and aſtringent qualities of the foreign. Their purgative qualities ſeem to be ſcarcely ſo ſtrong as thoſe of the Turkey, or even of the Eaſt-Indian; but the difference is not great. Some perſons in the profeſſion, with whom I have converſed, ſeem to think, that about three parts of the Turkey, or four of the Eaſt-

* The aſtringent and colouring principles are not the ſame; for the latter appears ſtrongly to impregnate the urine of thoſe who take the different kinds of rhubarb; but urine ſo tinged does not acquire a dark colour on being mixed with a ſolution of iron.

Indian,

Indian, operate as much as five of the Engliſh rhubarb; but others think the difference is ſcarcely ſo great. In point of aſtringency, the Engliſh rhubarbs do not perceptibly differ from the foreign.

Finally—If the Engliſh rhubarb ſhould be allowed to be inferior to the foreign, (which is perhaps doubtful) it appears probable that this inferiority is owing only to ſuch circumſtances as are in the power of attention and induſtry to obviate, and that this might be done in a good meaſure by attending to the following particulars:—

1ſt; A due regard to the age of the plant when taken up.—2dly; To its being cut tranſverſely, raſped on the outſide, having the ſappy parts cut out, and being quickly dried.—3dly; To its being kept ſome time (how long experience will dictate) after it is dry, before it be uſed.

Experiments relative to the Medical Effects of Turkey Rhubarb, and of the Engliſh Rhubarbs, No. I. *and* No. II. *made on Patients of the Pauper Charity.*

[By Dr. PARRY.]

N. B. The mark (—) in the ſecond column, ſignifies that the number of ſtools was unknown.

CLASS I.

Comparative Effects of the three Kinds.

Harriet Allen, aged 1½ year: Diſeaſe, ſickneſs and purging after the confluent ſmall-pox; on the 25th of April 1785, ſhe took eight grains of ipecacuanha, which operated well.

ENGLISH

English Rhubarb No. II.

	Dose in grains.	Stools.	
April 26	10	3	with a little griping.
27		4	less watery than before.
28	10	1	before 12 at noon.
29		—	

English Rhubarb No. I.

	Grains.	Stools.	
April 30	10	4	no griping.
May 1		3	
2	10	2	before 12 at noon with some griping.
3		2	with some griping.

Turkey Rhubarb.

May 4	10	4	with considerable griping.
5		2	with griping.
6		1	
7	10	3	with griping.
8		0	
			free from complaint.

2. Mary Best, aged 74: Disease, violent pain in her stomach, increased by swallowing, with head-ache and costiveness.

English Rhubarb No. II.

1785.			
Feb. 22		0	
23		1	
24	35	0	the powder taken at bed-time.
25		2	no griping.
26	35	0	the powder taken at bed-time.
27		4	slight griping.

English Rhubarb No. I.

Feb. 28	35	0	the powder taken at bed-time.
March 1	35	5 or 6	before night, after which the second powder was taken.
2		5 or 6	Pain of the stomach and head were much relieved, but afterwards increased.

Turkey

Turkey Rhubarb.

	Grains.	Stools.	
17		1	
18	35	0	no griping.
19		1	
20		1	
21		—	
22	35	3	ſlight griping.
23		1	
24		0	

English Rhubarb No. II.

25	35	2	ſlight griping.
26		1	
27		1	
28		1	
29	35	2	ſlight griping.
30		1	
31		1	

English Rhubarb No. I.

April 7	35	0	powder taken at bed-time.
8		3	with ſlight griping.
9		0	
10		1	
11		0	
12	35	0	powder taken at bed-time.
13		3	with ſlight griping.
14		0	

During the paſt week ſhe took every day a drachm of ſpirituous tincture of rhubarb, with ſimple bitter infuſion and chalybeate wine, which after the 14th were omitted.

Turkey Rhubarb.

15	35	0	powder taken at bed-time.
16		3	with ſlight griping.
17		1	
18		0	
19	35	—	powder taken at bed-time.
20		3	ſlight griping.

3. Hannah Foſter, aged about 38: Diſeaſe, catarrh, with flatulency and coſtiveneſs.

English

ENGLISH RHUBARB No. II.

1785.	Grains.	Stools.	
Jan. 12	35	3	no griping.
13		2	
14		—	
April 15	35	2	ſlight griping.
16		3	ſlight griping.
17		1	
18	35	—	powder taken at night.
19		4	ſlight griping.
20		1	
21		2	
22	35	1	powder taken at night.
23		4	ſlight griping.
24		1	

TURKEY RHUBARB.

25		2	
26	35	—	powder taken at night.
27		3	great griping.
28		0	
29	35	2	ſlight griping.
30		0	
31		2	

ENGLISH RHUBARB No. I.

Feb. 2	35	2	ſlight griping.
3		—	
4		—	
5	35	2	ſlight griping.

4. Mary Newman, aged 15½: Diſeaſe, pain in the pit of her ſtomach, paſſing through to the back, with faintneſs, coſtiveneſs, &c. She was ordered to bathe twice a week.

TURKEY RHUBARB.

Mar. 15		1	
16		0	
17		1	
18	18	1	great griping.
19		0	
20		0	
21		2	
22	18	1	with great pain in her ſtomach and
23		0	back.
24		0	

English Rhubarb No. II.

	Grains.	Stools.	
25	18	1	great griping.
26		1	
27		0	
28		1	
29	18	1	great griping.
30		0	
31		1	

English Rhubarb No. I.

April	1	18	1	ſlight griping.
	2		1	
	3		1	
	4		0	
	5	18	2	ſlight griping.
	6		1	
	7		1	All complaints remove

5. Elizabeth Hoſey, aged 30: Diſeaſe, loſs of appetite, ſickneſs and great flatulency: uſually a ſtool every other day.

English Rhubarb No. II.

1784.				
Dec.	16		1	
	17	35	2	conſiderable griping.
	18		0	
	19	35	1	great griping.
	20		0	
	21		1	great coſtiveneſs during this time
Jan.	4		0	
	5		0	
	6		0	

English Rhubarb No. I.

1785.				
Jan.	7	35	3	ſlight griping.
	8		0	
	9		0	
	10		0	
	11	35	5	the two laſt ſtools with conſiderable griping.
	12		1	
	13		1	

TURKEY RHUBARB.

		Grains.	Stools.	
Jan.	14	35	2	ſlight griping.
	15		0	
	16		1	
	17		0	
	18	35	3	ſlight griping.

6. Jane Middleton aged 26: Diſeaſe, loſs of appetite and ſickneſs, occurring by fits, which flatulency, pain in her bowels, and coſtiveneſs: took firſt an emetick, and afterwards, through the whole of the diſeaſe, a bark mixture.

ENGLISH RHUBARB No. II.

Jan.	19		0	
	20		0	
	21	35	1	great griping.
	22		0	
	23	35	1	leſs griping.
	24		—	

ENGLISH RHUBARB No. I.

25	35	6	ſlight griping.
26		1	
27	35	1	before 12 at noon with griping.
28		—	

TURKEY RHUBARB.

29	35	4	ſlight griping
30		3	
31	35	0	before 12 at noon; but ſlight griping.

7. Jane Middleton's child, aged 5 weeks: Diſeaſe coſtiveneſs.

ENGLISH RHUBARB No. I.

Jan. 20		0	
21	7	1	apparently with great griping.
22		0	
23	7	1	
24		1	
25	10	—	powder taken at night.
26	10	2	with apparent griping all day, before the ſecond 10 grains, which were taken at night.
27		0	before 12 at noon.

TURKEY RHUBARB.

		Grains.	Stools.	
Jan.	28	10	—	powder taken at night.
	29		2	with griping.
	30	10	1	powder taken at night,
	31		0	before 12 at noon.

ENGLISH RHUBARB No. II.

Feb.	1	10	—	powder taken at night.
	2		2	with griping.
	3		0	

8. Mary Penny, aged about 50: Diſeaſe, pain in the ſtomach and bowels, after eating: one ſtool a day.

ENGLISH RHUBARB No. II.

1784.				
Sept.	23		1	
	24	25	2	conſiderable griping.
	25		—	
	26		—	
	27		—	
	28	25	2	conſiderable griping.
	29		—	
	30		0	

TURKEY RHUBARB.

Oct.	1		—	
	2	25	2	no griping.
	3		0	
	4	25	0	

ENGLISH RHUBARB No. I.

			—	
		25	0	
			0	
			0	
		25	0	
	10		0	
	11		0	
	12	30	2	ſlight griping.
	13		0	
	14		0	
	15	30	3	

9. Bridget Hatherfidge, aged 2 ¼: Diſeaſe, conſiderable hardneſs and ſwelling in the belly, with two looſe ſtools a day.

TURKEY RHUBARB.

	Grains.	Stools.	
1784.			
Nov. 16	10	9 or 10	a good deal of griping.
17		0	
18		5 or 6	
19	10	8 or 9	a good deal of griping.
20		2 or 3	
21		3	
22		2 or 3	

ENGLISH RHUBARB No. II.

Nov. 23	10	12 or 13	ſickneſs and a good deal of griping.
24		7	
25		6	
26	10	10	leſs griping.
27		6	
28		4	
29		2	

ENGLISH RHUBARB No. I.

Nov. 30	10	2	no griping.
Dec. 1		0	
2		0	
3	10	2	ſlight griping.
4		—	
5		—	
6		1	

10. Thomas Gore, aged 35: Head-ach, with pain and ſourneſs in his ſtomach, and coſtiveneſs.

ENGLISH RHUBARB No. II.

1784.			
Oct. 8	30	0	
9			
10			
11			coſtiveneſs during this time, as before.
12	30	0	
13			
14			

Turkey Rhubarb.

		Grains.	Stools.	
Oct.	15	30	1	great griping.
	16		0	
	17	30	1	great griping.
	18		0	

English Rhubarb No. I.

Oct.	19	30	2	conſiderable griping.
	20		0	
	21		0	
	22	30	2	conſiderable griping.
	23		0	
	24		1	
	25		0	

English Rhubarb No. II.

Oct.	26	30	2	conſiderable griping.
	27		0	
	28		1	
	29	30	2	leſs griping.
	30		0	
	31		1	

Class II.

Miſcellaneous Comparative Experiments.

1. Eſther Rolf, aged 33: Diſeaſe, flatulency and pain in the ſtomach, with coſtiveneſs.

English Rhubarb No. I.

Sept.	28	30	5	no griping.
	29		1	
	30		1	
Oct.	1		1	
	2	30	5	no griping.

English Rhubarb No. II.

Oct.	12	30	3 or 4	ſlight griping.
	13			bowels regularly open.
	14			
	15			
	16	30	3 or 4	ſlight griping.
	17			bowels regularly open.
	18			
	19			

2. Sarah Stuart, aged 33: Diſeaſe, pain and flatulency in the ſtomach, with coſtiveneſs.

ENGLISH RHUBARB No. I.

1784.		Grains.	Stools.	
Oct.	5	25	3	ſlight griping with the laſt ſtool.
	6		0	
	7		1	
	8	25	1	ſlight griping.
	9		0	
	10		1	
	11		0	
	12	30	3	great griping.
	13		0	
	14		1	
	15	30	2	no griping.
	16		0	
	17		0	
	18		1	

ENGLISH RHUBARB No. II.

Oct.	19	30	1	conſiderable griping.
	20		1	
	21		0	
	22	30	2	ſlight griping with the firſt ſtool; conſiderable with the ſecond.
	23		0	
	24		1	
	25		0	

TURKEY RHUBARB.

Oct.	26	25	2	the laſt ſtool with griping and ſickneſs.
	27		0	
	28		1	
	29	25	1	no griping.
	30		0	
	31		1	

3. William Greenaway, aged 8: Diſeaſe, pain in his head and bowels, ſickneſs, and purging four times a day: he took firſt two vomits of ipecacuanha, but the purging ſtill continued.

ENGLISH RHUBARB No. II.

		Grains.	Stools.	
Mar.	15	12	6	no griping.
	16		1	
	17		—	
	18	12	2 or 3	no griping.
	19		—	
	20		—	
	21		—	purging cured.

ENGLISH RHUBARB No. I.

April	7		—	purging ſomewhat returned.
	8	12	4	no griping.
	9		—	
	10		3 or 4	
	14			bowels open ever ſince the 10th, without purging.

CLASS III.

Miſcellaneous Experiments.

1. Thomas Saunders, aged 27: Diſeaſe, purging of brown ſtools for two months, without blood or ſcybala, to the amount now of near forty per diem, with great flatulency and griping: took firſt a vomit of ipecacuanha.

ENGLISH RHUBARB No. I.

April	26	30	6 or 7	leſs griping than before.
	27		5	
	28		3	before one at noon, with great griping, ſickneſs, and vomiting.

2. Charles Philips, aged 3½: Diſeaſe, putrid fever, with ſlight purging of white ſtools.

ENGLISH RHUBARB No. I.

Dec.	2	8	5 or 6	no griping.
	3		—	fewer ſtools on theſe days than on the 2d inſtant.
	4		—	
	5		—	
	6	8	5 or 6	no griping.
	7		—	purging much diminiſhed.

3. Mary Pye, aged 19: Diſeaſe, ſlight purging, &c.

ENGLISH RHUBARB No. I.

		Grains.	Stools.	
Oct.	8	25	0	
	9		1	
	10	25	1	
	11		0	

4. Eliz. Gibbons, aged 2 ½: Diſeaſe, purging thrice a day.

ENGLISH RHUBARB No. II.

Sept.	26		3	
	27		3	
	28	8	4	
	29		3	
	30		3	
Oct.	1	8	3	
	2		3	
	3		3	
	4		3	
	5	10		three or four more ſtools on the intermediate days than on thoſe on which the rhubarb was taken.
	6			
	7			
	8	10		

5. Hannah White, aged 28: Diſeaſe, violent purging, with pain in the bowels, and conſiderable feveriſh heat.

ENGLISH RHUBARB No. II.

Nov.	5	30	2	pain in the bowels conſiderably leſs than before.
	6			more than two ſtools on each of theſe days.
	7			
	8	30	2	Pain leſs than the preceding days. Purging afterwards more violent than before.

6. Jane White, aged 9 ¾: Diſeaſe, purging for two days, of three or four ſtools a day.

ENGLISH RHUBARB No. II.

		Grains.	Stools.	
Feb.	2	15	2	ſlight griping.
	4		3 or 4	
	5		3 or 4	
	6	15	4	ſlight griping.
	10		—	purging much removed

7. Elizabeth Hoſey, jun. aged 4 ¾: Diſeaſe, clay-coloured ſtools.

ENGLISH RHUBARB No. II.

Dec.	15		2	
	16		1	
	17	14	3	no griping.
	18		1	
	19		3	no griping.
	20		1	
	21		1	ſtools of the natural colour.

8. Elizabeth Hibbert, aged about 60: Diſeaſe, pain in the bowels.

ENGLISH RHUBARB No. I.

Oct.	8	35	3	
	9		—	
	10	35	3	
	11		—	
	12		—	
	13	35	3	
	14		—	
	15	45	3	great griping.
	16		0	
	17		0	
	18	45	4	great griping.

LETTERS

TO THE

BATH AND WEST OF ENGLAN AGRICULTURE SOCIETY.

ARTICLE I.

On the Farm-Yard Management of Dung.

[By ARTHUR YOUNG, eſq.]

GENTLEMEN,

DURING my reſidence at North-Mims, in Hertfordſhire, I kept a regiſter of a great number of experiments and obſervations, which I intended afterwards to reviſe and publiſh: but in this I did wrong; for ſuch minutes ſhould be publiſhed while they are yet freſh in the memory, that the obſervations and concluſions drawn from them may be founded not only on the direct circumſtances of the trial, but on the general colour of the ſeaſons, and ſituation and nature of the farm. On quitting it, I went directly to Ireland;

and from that time till I ſettled in Suffolk had no time to look over thoſe papers, ſome of which were loſt in moving.

But on examining them lately, I find a ſeries of minutes of the Farm-yard management, which I think ought not to be deſtroyed, as they contain an attempt to aſcertain the expence of that manure, which has not, at leaſt to my knowledge, yet been done; being indeed a very difficult and complex, though intereſting, queſtion.

I ſhall premiſe, that I inſert this account exactly as written at the time, and not as a general eſſay on the ſubject, to contain the whole of my opinion formed on ſucceeding experience, as well as on that which is here noted.

I.

The Manure raiſed in the Farm-Yard during the Winter 1768-9.

My ſtock of cattle this winter was, ſix horſes, four cows, and nine lean hogs.

The ſtraw, &c. for making into dung, was, thirteen acres of wheat, and twelve of oats, beſides which I bought eight loads of ſtraw, and three of haulm.

I calculate

I calculate that the 25 acres of corn yielded 18 loads of ſtraw. The whole therefore was 29 loads. The cows and horſes conſumed 16 loads of hay.

The cows and ſtock-ſwine ran looſe in the yard, and had their ſtraw given in cribs; the ſtables and fat hog ſties were cleanſed into the yard. In May, the whole was turned over and laid into ſquare heaps; and in June carted away. The quantity 118 loads, each 36 buſhels, which is the quantity made by 45 loads of hay and ſtraw, which is near $2\frac{3}{4}$ loads of dung for one of hay or ſtraw, and 12 loads a head for the horſes and cows.

EXPENCES.

			£.	s.	d.
8 loads of ſtraw, (average 13s. 1d. per load)			5	5	3
3 loads of haulm	—	——	1	5	8
18 loads of ſtraw	—	——	11	15	6
Labour in ſhovelling up the dung, and turning it over	—	——	0	12	0
		£.	18	18	2

From hence it appears, that had the ſtraw been bought merely to litter cattle with, the dung ſo raiſed would have coſt 3s. 2d. per load of 36 buſhels. Conſidering that it is on the ſpot, and no expence therefore of carriage in bringing it, this price I

think is not dear. I would certainly buy dung ſo to have it delivered at my farm. But this is not the point of view in which the 18l. 18s. 2d. ſhould be conſidered; for four cows were partly wintered out of it. They ate ſtraw the whole winter, beſides their hay; this is to be reckoned at 6d. a week, or 2l. 12s. which reduces the 18l. 18s. 2d. to 16l. 6s. 2d. which is 2s. 9d. per load;—a price cheaper than dung can be had in any other method.

II.

The Manure raiſed in the Farm-Yard during the Winter 1769-70.

This year the ſtock of cattle was 7 horſes, 7 cows, 3 calves, beſides hogs. The ſtraw, fern, and ſtubble, for making into dung, was 67 loads, viz.

11 waggon loads of fern
16 loads of ſtraw bought
30 ditto, the product of 33½ acres of ſpring corn
10 waggon loads of ſtubble, bought at 7s.

And 22 loads of hay conſumed by the horſes, cows, &c.

I altered my management this year; for in Auguſt, September, and October, I carted in 591 loads, 18 buſhels each, of turf and ditch earth, which were ſpread over the yard, about 2 feet deep, except round againſt the buildings to the breadth of 6 or 7 feet, which was left as a path. On this bed

bed of earth the ſtables, cow-houſe, hog-ſties, &c. were cleanſed; and the cribs with ſtraw for the looſe cattle were moved about it.

My deſign in carting this earth was to retain the urine; a ſmall gutter which runs into a neighbouring horſe-pond drains the yard: the ſituation is ſuch, that I could not ſtop it in the way to make any uſe of it; and as rain will always make the farm-yard overflow, which occaſions an abſolute neceſſity to give it an outlet, I was deſirous of ſtraining it well through this layer of turf, &c. which I apprehended would retain much of the virtue of the water before it ran off. With this intention, I formed two ſmall holes on the ſide of the compoſt for the water to drain into, and I made one of my people very often throw up all the water from thoſe holes unto the dunghill, until no more would drain in for the preſent; this was repeated many times every week, eſpecially when the weather was dry, as then the virtue of the water is ſo much the greater; the colour of it alſo is a good indication of the proper time to perform this operation.

Several gentlemen, to whom I have mentioned this method of proceeding, have objected, that I increaſe the ſize of my dunghill without adding to its virtue—that 100 loads of pure dung are far

better than 100 loads of dung and earth mixed—that I greatly increaſe the expence of carriage; and that the more you reduce manure to its eſſence, the better.

With ſubmiſſion, I differ from them in every particular. The enquiry is not whether 100 loads of dung be better than 100 loads of my compoſt, but whether it be better than the ſame quantity of dung mixed with 50 loads of earth in the manner I have mentioned.

Let it be conſidered, that the dung, as it is commonly managed, has its virtue waſhed through without any other ſubſtance being ready to receive it. Therefore, the point in queſtion is, the addition which I make to my dunghill by retaining ſo much of the urine, and the waſhing of the dung; it is not the mere compariſon of the dung and earth, though I ſhould be inclined to the practice, if that only were the caſe; but it is the addition which I gain of urine. When the whole compoſt is mixed together, it is not mere earth that is under the dung, but a body replete with riches; turf, earth, &c. quite ſaturated with urine, and all thoſe particles which rain, &c. carry through dunghills; the mixing theſe bodies together renders the whole maſs nearly of equal goodneſs: on ſome ſoils it undoubtedly

undoubtedly is as good, and particularly on mine; for ſpread the eſſence of dung, which theſe gentlemen are ſo fond of, and it is waſhed through our gravels in one ſeaſon; a top-dreſſing of ſoot, pigeon's dung, &c. laſts but one crop; and very rotten pure dung ranks much in the ſame manner. With ſuch a compoſt as I recommend, the caſe is different.

I have ſome binding pebbly loams, that have ſo ſtrong an adheſion, as to be what the farmers juſtly call moſt *unkindly land*; for it has the tenacity of clay without any of its virtues. Small quantities of dreſſings, however rich, are of little benefit on theſe ſoils; a pound of the eſſence of dung would be ſo faſt locked up in a large clod, as to be rendered totally uſeleſs for a whole ſeaſon: a rich top-dreſſing of ſoot, &c. is oftentimes quite loſt on ſuch land. For this reaſon, nothing does ſo well with it as compoſts not kept long, carried on in very large quantities. I would not give 20s. for twenty loads carried on to an acre, though I would give 3l. for forty loads; there muſt be quantity enough to keep the clods and looſe earth from uniting, or elſe the dunging is of little ſervice. I need not add of what conſequence a ſtrong fermentation, completed in the ſoil, muſt be to this land; but ſmall quantities, however rich, raiſe no fermentation. The

richer

richer the dung, according to the ideas of theſe gentlemen, the leſs the fermentation. This is an argument in favour of *quantity*, for the yard compoſt (unleſs for meadow ground, which is an exception to this reaſoning, from the difficulty of entrance into the ſoil) ſhould be carried on to the land, and ploughed in while in full fermentation, which is before its quantity is much diminiſhed. Let it however be remembered, that this reaſoning is here applied particularly to the ſoils in queſtion; there are others in which it would not be proper.

As to carriage being increaſed; farmers form compoſts of earth and dung, ſtratum ſuper ſtratum, a practice extremely common; the expence is the ſame as in my method, only by making the heap in my yard, I have the advantage of retaining the urine, &c. in the manner of which I have ſpoken.

The compoſt became by the middle of May of an uncommon ſize for ſo ſmall a farm as mine, (only 97 acres) it was in ſeveral parts ſix feet thick, and in all four or five. I then ſet about turning it over, and mixing it well together; in doing this, I agreed with four labourers to perform that operation, and alſo to cart it into the fields, and ſpread it on the land, I finding them two three-wheeled carts and a horſe; and they to receive for the whole

job

job a guinea per hundred loads; the carts hold 18 buſhels. It was accordingly done, and the quantity was 1106 loads.

In the turning it over, they purſued the method common in this country, of keeping an open trench through the heap, and throwing into that all the earth, and much of the dung, which is there cut in pieces before it is thrown up on that part of the heap that is finiſhed; attention being given to mix the earth and dung well together.

Total	—	1106 loads
Deduct	—	591
Remain	—	515

Which is near ſix of dung for each of hay, ſtraw, &c. Laſt year the proportion was $2\frac{3}{4}$ at 36 buſhels each, ſo that the quantity this year exceeds; but then the cabbages eaten in the yard are not included, which would reduce it ſomething. For horſes and cows it is 79 loads each.

EXPENCES.

		£.	s.	d.
Carting 591 loads of earth into yard		3	16	10
Team, &c. at ½d. a load.	—	1	17	0
11 loads of fern at 6s.	——	3	6	0
One man 6 days	—	0	7	0
Team and repairs 6 days, at 10s. 3d.		3	1	6
Carried over		£.12	9	4

Brought over			£.12	9	4
10 loads of ſtubble at 7s. (the price of the ſtubble and the chopping)			3	10	0
Two men at ditto 4 days	——		0	5	4
Team, &c. ditto at 10s. 3d.	—		2	1	0
16 loads of ſtraw at 12s. 5d.	—		9	19	0
30 ditto at 12s. 5d.	——		18	12	6
Labour in ſhovelling and throwing up water	—	——	0	17	0
[The guinea per 100 loads, for turning, filling, carting, and ſpreading, is 2½d. per load, which is thus divided,					
Turning over -	0	0 0¾			
Filling and carting	0	0 1½			
Spreading - -	0	0 0¼			
	0	0 2½]			
Of this only the turning is to be charged here; it is	——		3	9	1
Total			£.51	2	4

[I ſhould explain, that the expence of the team, and the wear and tear of carts, waggons, and harneſs, are throughout theſe minutes reckoned at what they actually coſt: at the end of every year the expence incurred was proportionably divided among the work done, according to the ſtrength, labour, wear, and other circumſtances. This is the only minutely accurate way of knowing the real expence of work; it proceeds on the principle, that if two horſes coſt 20l. and they plough 20 acres in the year, doing no other work, the expence is 20s. an acre. Thoſe men who have their teams idle to ſave expence, know very little of what their real expence is.]

But from hence muſt deduct the cattle at ſtraw. I ſhall calculate the cows 26 weeks at 6d. per week, and the calves the ſame at 3d.

The

The total		£.51	2 4
7 cows 26 weeks at 6d. -	4 11 0		
3 calves at 3d. - -	0 19 6		
		5 10	6
Total for dung -		£.45	11 10

1106 loads at this amount come to 9¼d. per load.

I am very clear in my own opinion that no purchaſed manure will be gained ſo cheap as this. Draw whatever compariſon you pleaſe between the ſuppoſed value of this compoſt, and the ſuperior worth of richer ſorts, yet the quantity of one for a given price will ſo vaſtly exceed that of the other, as to have a deciſive ſuperiority; the worſt manure I can purchaſe in the neighbouring towns comes to from 4s. to 5s. a waggon load of 80 buſhels, beſides a whole day's work of four horſes, a man, and a waggon. Suppoſe the Hertfordſhire price of 10s. for this team, and 4s. the dung, this is 14s. for 80 buſhels, or 3s. 2d. a load of 18 buſhels. Relative to the value of ſuch dung, it is very difficult to form a compariſon, for the heaps one buys are ſmall, and not two alike; but a great proportion of the quantity, I am very clear, from the grittineſs and extreme heavineſs of the load, is ſhovelled up in the turnpike; and I have not, from the cloſeſt obſervation I could make, ſeen any ſuperiority in it over my own farm-yard compoſt. It is true, I ſometimes

times get a dunghill of pure old rotten dung, quite black, ſpit dung; but it is rarely to be had, and the price 7s. a load: but all purchaſed dung, except in the neighbourhood of great cities, can be had only in ſmall quantities, whereas litter of ſome ſort or other, and food for cattle, are every where to be had.

III.

The Manure raiſed in the Farm-Yard, during the Winter 1770-1.

This winter I proceeded in a different manner with my dung from what I had ever done before. In the ſummer of 1770, I was at Mr. Bakewell's, at Diſhley in Leiceſterſhire, and remarked that he piled his dung up in a clamp in the middle of ſome of his yards; the idea pleaſed me the moment I ſaw it, and I determined to execute it upon my own farm. Mr. Bakewell uſes only dung, but I thought it would be an improvement to unite my own method with this; and accordingly made a layer of hedge earth from a border that had been grubbed, two feet deep, and about twelve feet ſquare. This was done the beginning of November. The quantity of earth 26 loads (of 16 buſhels.) The yards and ſheds were all cleaned on to it, which began my compoſt.

That I might be able to make the greater plenty of dung, I purchaſed 43 waggon loads of fern at 6s. a load,

a load, building ſtacks with it;—and I had five waggon loads of ſtubble left from laſt year.

My cattle conſiſted of 6 horſes, 4 cows, and a yearling, beſides hogs. The cows were kept tied up under a ſhed, and regularly littered with ſtubble or fern; but I ſhould obſerve, that I gave them ſo much room that it was not neceſſary to clean and litter every day, as is common; for if they are confined to a ſpot, they lie too dirty without it; but by giving them room to turn about, they were kept quite clean by only ſupplying them with freſh litter, and the whole cleaned out once a week. This I did that the manure might be the better, from receiving and retaining ſo much the more urine; nor did I throughout the winter perceive the cattle the leaſt prejudiced by this method.

I kept the yard littered about ſix inches deep with fern to ſoak up the urine, and alſo to be made dung by the hogs, the only looſe cattle; this was cleaned up once a fortnight.

Thus the yard, the cow-ſhed, the hog-ſties of ſows and fatting hogs, and the ſtables, were all cleaned into three-wheeled ſmall carts, and piled regularly on the foundation of earth, until the heap was about ſeven feet high; and when one was filled up, another foundation adjoining was made.

And

And in order to make the compoſt the better, the flowings of the yard were partly prevented from running off, by being in one place kept a foot deep, from which they were very often thrown up on the compoſt with a water bowl. This liquid was the better from my penning thirty wether ſheep every night on fern in a corner of the yard; but this dung was not removed till the ſheep were in May begun to be fattened.

The cows were fed on cabbages and ſtraw, and the lean hogs on cabbages alone.

I have already mentioned that I began the compoſt with 26 loads of earth, the beginning of November; the firſt week in December, 25 more were carried; and the middle of the ſame month 26 more. The beginning of January 18 more; the end of that month 22 more; the end of March 19 more.

November 26 loads.	January 18
December 25	Ditto 22
Ditto - 26	March 19

Total of earth 136 loads.

STOCK.

Four cows, One yearling, Six horſes.

STRAW,

STRAW, &c. eaten, and LITTER uſed, were

5 waggon loads of ſtubble at 7s.
25 ditto of fern
4 loads of ſtraw, bought at 12s.
5 ditto, the product of four acres of oats, 12s.

19 loads of hay.

58

Beſides cabbages, and ſome turnips.

May the 27th, began to turn it over, mixing the whole well together. My agreement with the labourers was, to turn over, fill, and ſpread, at 1¾d. per load, which divided is,

Turning over ¾, Filling ¾, Spreading ¼ per load.

Carted it for cabbages, potatoes and carrots. The amount 367 loads; beſides 23 loads of ſheep dung, made by 30 wethers; and about 70 loads, the laſt diviſion of the heap, not touched, as it was not ſufficiently rotten.

In all	-	460 loads.
Earth	-	136
Remain	-	324 loads.

Which is about five and a half loads of dung for every load of ſtraw, hay, and litter.——This is nearly the proportion of laſt year, and nearly that of the preceding one alſo, which ſhews that five loads and a half (of 18 buſhels) may be depended on for a load of hay or litter on an average.

EXPENCES.

EXPENCES.

	l.	s.	d.
Carting 136 loads of earth into the yard, at ¼d. per load — —	0	8	6
Grubbing 29½ poles of border at 5d.	0	12	5½
Ditto 5 ditto at 6d. — ——	0	2	6
Six days driving ditto — —	0	7	0
Horſes, &c. at 1½d. ——	0	14	2
Five waggon loads of ſtubble —	1	15	0
Two men at ditto 2 days ——	0	4	8
Team at 10s. 3d. — —	1	0	6
25 loads of fern at 6s. ——	7	10	0
One man at ditto 13 days —	0	14	2
Team at ditto 25 loads at 5s. 4d. —	6	13	4
Four loads of ſtraw bought at 12s. —	2	8	0
Five ditto from 4 acres of oats, 12s.	3	0	0
Labour in piling up the dung, cleaning, ſhovelling, littering, and throwing up the water — ——	2	9	4
Turning over 305 loads at ¼d. per load	0	19	0
	£.28	18	7½

The remainder for carrots and potatoes was not turned then.

But from hence, as before, we are to deduct the keeping of the cows:

Four cows 26 weeks, at 6d.	£.2	12	0			
One yearling ditto, at 4d.	0	8	8	—3	0	8
Coſt of the manure				£.25	17	11½

460 loads coming to this ſum, the proportion is 1s. 1½d. per load.

Now

Now as to the ſucceſs of piling it up in a clamp, I muſt obſerve, that from this winter's experience, I am clear it is an excellent method. What I uſed early in the ſpring, was in very good order for arable land; which would not have been the caſe had it been trodden flat over the whole yard, every particle to be waſhed by the rain: fermentation goes on much quicker in this method; and it would be better ſtill if the heap were made under a roof, to keep off all water but what is thrown up. This I ſhall not be at the expence of.

Another advantage which is peculiar to this method is, the being able to uſe any part of the compoſt you pleaſe, without the old dung being mixed with freſh, by taking a diviſion of the hill that has been finiſhed ſome months: this for many uſes is an important point. But the great object is the improvement in the quality of the dunghill, and getting it in order for any crops.

Reſpecting the ſheep pen, it is a practice I never tried before; but I am ſo well pleaſed with the ſucceſs, that I ſhall never winter any ſheep without it. In a warm corner of the yard I incloſed a ſpace ſufficient for holding thirty ſheep, and kept littering it with fern every day or two, ſo as always to have a dry clean bed at top for them, and this without

any layer of earth; in which, however, I failed. In five months they made me 23 loads of excellent rotten dung. It was an omiſſion not to appropriate a load of fern, that I might have known the expence and profit, but the value of the dung was not as prices go in this country, under 2s. a load, or 46s. from thirty ſheep. The ſheep contracted no diſorder of any kind from lying on the heap;* and went through the winter in full health. Indeed it muſt ſtand to every one's reaſon that ſuch a lodging muſt be far preferable to the wet earth expoſed to the driving rains and cold winds.

IV.

The Manure raiſed in the Farm-Yard in the Winter 1771-2.

The ſeventy loads left of laſt winter's heap, being the laſt diviſion built, remained through the ſummer of 1771 untouched, and the dung of this winter piled in diviſions againſt it. In October the whole yard was littered about five inches thick with fern. The latter end of that month, and through November, I took up ſomething more than an acre and a half of carrots, which were carted into the

* This is what we ſhould not have expected; and although Mr. Young's ſheep eſcaped injury, we cannot recommend the practice, as the exhalations ariſing from a fermented maſs of manure muſt, we think, be very unhealthy, particularly for ſheep.

yard,

yard, and there topped and cleaned; the ſwine attended the workmen, and ate many of the tops, but many were alſo trodden down with the dirt.

November the 4th, took in the horſes. The 18th, tied up the cows under their ſheds, littering them firſt with a good bed of fern, but afterwards they waſted ſtraw enough to keep themſelves well littered.—Six horſes, two large cows, two Alderney ditto, a ſteer 3 years old, a heifer coming 8, and 3 calves of the preceding ſpring; in all 15 head.

Dec. 14th, made a foundation for a diviſion of the hill, with twenty loads of earth.

Upon taking the cattle in, I began threſhing; but foreſeeing that I ſhould not have a ſufficiency of ſtraw, I purchaſed four loads the 8th of January.

Jan. 27th, made another foundation of forty-ſix loads of earth. The 30th, purchaſed two loads more of ſtraw. This is a commodity ſo very ſcarce this year, owing to the cheapneſs of cattle, that I am forced, for the ſix loads I have bought, to pay 14s. a load, and to ſend ten miles for it.

Feb. 10th, two loads more from the ſame place, one at 14s. and one at 17s. Much of this was peaſe

ſtraw, and being good, I have fed all my horſes with it, and they perform their work well, but then they have a regular allowance either of carrots or oats.

The fifteen head of cattle ate ten truſſes of ſtraw every day; beſides what is uſed to litter the ſwine.

Feb. 19th, made another foundation with thirty-ſix loads of earth. The 24th, bought a load and a half of ſtraw more; March 9th, as much more. At this time, turned over all the dunghill, except the laſt diviſion, deſigning it for potatoes. Put it out to the men on the ſame terms as laſt year, to turn over, fill, and ſpread.

While this work was performing, I had an opportunity of obſerving the effect of throwing up the drainings of the yard, which I had regularly performed; one ſide of the hill was not near watered ſo much as the other, owing to its being more diſtant from the lower part of the yard that retained the drainings; in that part of the heap the dung was not equally rotten, nor had it that putrid moiſture diſcernible in much of the latter. Let me alſo obſerve, that the parts which conſiſted moſtly of fern, were much ſounder, though of double the age, than others which conſiſted of ſtraw.

March

March 30th, bought two loads more; and the 20th of April two more. The beginning of that month turned over the whole.

The Earth brought in was 102 loads, viz.

December 14th	——	20
January 27th	—	46
February 19th	——	36

Straw, &c. and Litter.

18 loads of fern
15 loads of ſtraw bought.
35 ½ ditto, the product of 21 acres
16 loads of hay

84½ loads—Beſides cabbages.

Carted, after turning over for potatoes, cabbages, and turnips,

The total of loads	— —	456
Deduct 70 loads accounted for laſt year		70
	Total of this year	386
	Deduct —	102
	Remain	284

Or about three of dung for each load of hay and litter, which is leſs than I have had before, owing, I apprehend, to my attending more to the throwing up the water, and thereby rotting it more and ſooner than before.

EXPENCES.

	£.	s.	d.
Carting 102 loads of earth at ¾d. —	0	6	4½
Three days driving ditto ——	0	3	6
Team, &c. at 2½d. — —	1	1	3
Eighteen loads of fern, at 6s. ——	5	8	0
One man at ditto, 9 days —	0	10	6
Team at 5s. 4d. — ——	4	16	0
Fifteen loads of ſtraw bought —	10	13	0
Team, labour, &c. 8 days, at 16s. 10d.	6	14	8
Thirty-five loads and a half at 15s.	26	12	6
Labour in piling up, cleaning, littering, and watering — ——	2	17	8
Turning over 386 loads at ¼d. —	1	4	1½
	£.60	17	7

Deduct 5 cows 26 weeks, at 6d.	3	5	0			
Three calves at 4d. —	1	6	0			
4 horſes 11 weeks ſtraw, at 6d.	1	2	0			
Two ditto 23 weeks, at 6d.	1	3	0			
				6	16	0
Coſt of the manure				£.54	1	7

Which is 2s. 9d. per load.

The compoſt came laſt year to only 1s. 1½d. now to 2s 9d.; this great riſe is owing to three reaſons:

1ſt. The dearneſs of all the work of the team, owing to the price of corn and hay.

2dly. To the extreme high price of the ſtraw; what I bought came to (with carriage) 1l. 2s. 5d. per load.—And,

3dly. By

3*dly*. By watering the heap more than uſual, it was more purified, and conſequently leſs in quantity.

V.

The Manure raiſed in the Farm-Yard in the Winter 1772-3.

I purſued the ſame ſyſtem this year, as before, except the cows and two horſes being for a ſhort time looſe in the yard, not tied up as before. The quantity of earth carried in at different times was 115 loads, 30 of which were ditch ſtuff, the reſt turf from furrows ploughed in a meadow; conſequently excellent for a compoſt. Beſides this I brought twelve waggon-loads of chalk, being a very fine marle; but as ſome of it was wet and heavy, I do not reckon theſe loads to contain more than three cart loads.

A farther addition made to the heaps during the winter, conſiſted of different manures brought from London; two waggon loads of aſhes, (each 90 buſhels) four ditto of bones, (90 buſhels) one cart load of bones, (36 buſhels) and five waggon loads of night ſoil, (each 60 buſhels.) I conceived that mixing theſe different bodies with my yard-dung, as it was made, would very much enrich the whole maſs.

Litter,

very well on them for three weeks, and in rooting among them brought them into a fine ſtate for putrefying. I ſhould obſerve, that the little ſummer heap of dung, &c. was ſo diſpoſed in the lower part of the yard as to keep in a large puddle of water, which in ſummer becomes very black and rich, and is of excellent ſervice for rotting weeds, or rubbiſh of any kind. The only caution neceſſary is to take care it is not too deep, as any thing entirely immerſed will not rot; but if much of what you throw in lies between wind and water, and is ſometimes ſtirred, it will preſently rot. When the hogs had done with the potatoe tops, they were ſucceſſively thrown into this water, and ſo became a very putrid rich body of manure.

I formed the compoſt hill in the ſame manner as laſt year: laying ditch earth at bottom, and piling up the dung upon it; that is, the ſtables, ſheds, and hog-houſes, were cleaned on to them; the cattle being 6 horſes, 11 cows, ſteers, and heifers, beſides many hogs lean and fatting.

I alſo brought from London, one waggon load of bones, and ſeventeen of night-ſoil, which I had got thrown up early in autumn, to be dry enough to bring; yet herein I was diſappointed, for it was but in indifferent order, ſo that theſe ſeventeen loads,

loads, from wetneſs, were not equal to more than twelve full ones dry. In point of quantity, therefore, I muſt call the London manure 13 waggon loads, or 65 cart loads.

The quantity of earth carted in was 157 loads. The litter, &c. uſed was 60½ loads, viz.

12 loads of ſtraw bought
31 from my own crop
17½ of hay.

The total heap amounted to 532 loads, and the coſt 38l. 9s. 7d. Earth, &c. deducted, it is 375 loads, or 6 for every load of hay and ſtraw. The expence is 1s. 5d. per load.

Part of the account of this year's dung, and the whole of the winter 1774-5 was loſt.

Average, Five loads of dung, at 18 buſhels per load of hay and ſtraw.

	Loads.		Loads.
1768	5¼	1771	3
1769	6	1772	4
1770	5½	1773	6

Upon this I may obſerve, that, ſuppoſing forty loads a good manuring for an acre of land that has

has once been improved, the conſumption of eight loads of ſtraw and hay yields that quantity, with the help of certain portions of earth, at the ſame time that the live ſtock is ſupported by ſuch conſumption;—and if an acre of corn yields two loads of ſtraw, which it does on an average, then one-fourth of the corn and hay ground is manured every year, which proves at once the excellency of the ſyſtem; for that proportion is very rarely attained on any farm, if tithe-gathering is not connected with it.

The expence per load of 18 buſhels, was

	£.	s.	d.		£.	s.	d.
In 1768	0	1	4½	In 1771	0	2	9
1769	0	0	9¾	1772	0	2	4½
1770	0	1	1½	1773	0	1	5

The mixture of London and other manures makes me omit drawing my average.

Article II.

Miſcellaneous Obſervations on a variety of Plants, &c. conſidered in an Agricultural and Commercial View.

[By Mr. Abraham Crocker, of Frome.]

Gentlemen,

TO a Society whoſe principal view is the promotion of Agriculture, every ſpecies of uſeful information, relating to the vegetable kingdom, may be uſeful. I ſhall therefore take the liberty of preſenting you with a few detached obſervations on a variety of plants, &c. collected from various authors, which, although generally known by perſons ſkilled in botany, may be new and uſeful to many of your readers, if you ſhould think them worthy of publication.

Butterwort—Yorkſhire Sanicle—on Bogs.

If the freſh-gathered leaves of this plant are put into a ſtrainer through which the warm milk from the cow is poured, and the milk is ſet by for a day or two to become aceſcent, it acquires a conſiſtence and tenacity; the whey does not ſeparate, nor does the cream. In this ſtate it is an extremely grateful food, and uſed as ſuch by the inhabitants of *Sweden*. Half a ſpoonful of this prepared milk,

milk, mixed with freſh warm milk, will convert it to its own nature; and this again will change another quantity of freſh milk, and ſo on *ad infinitum*. The juice of the leaves will kill lice in ſheep and other animals. The common people uſe it to cure cracks or chaps in cows udders. This plant is thought to occaſion the diſeaſe called the rot in ſheep. But it is much more likely that this diſeaſe is owing to a flat inſect called the *fluke*, [*Faſciola hepatica*] which frequently adheres to ſtones and plants in marſhy grounds, and other wet ſituations; as the ſame inſects are found in the liver and biliary ducts of ſheep infected with the rot. No cattle will feed on this plant.

Sheep's Feſcue.

An excellent graſs, which flouriſhes beſt in a dry ſandy ſoil. Cows, horſes, and goats, will eat it, but it is the favourite food of ſheep. They prefer it to all other graſſes, and being very ſucculent, it fattens them ſooner than any other. The *Tartars*, who lead a wandering life with their flocks and herds, always chooſe thoſe ſpots where this graſs abounds. The ſuperiority of the Spaniſh, and ſome of the Engliſh wool is probably owing to the abundance of this graſs in hilly paſtures where ſheep are kept. It is certainly worthy particular cultivation by farmers.

Flote

Flote Feſcue.

In Wet Ditches and Low Lands common.

The ſeeds of this graſs are ſmall, but very ſweet and nouriſhing. In divers parts of Germany and Poland, they are collected under the name of Manna ſeeds, and ſerved up in ſoups and gruels at the tables of the great, on account of their grateful flavour, and nutritious quality. When ground to meal, they make bread, very little inferior to that in common uſe. The bran is a remedy for the worms in horſes, but they muſt be kept from water for ſome hours afterwards. The ſeeds are excellent food for geeſe.

Broom Graſs, [*Compact. Hordeaceus.*]

The ſeed of this graſs, mixed with corn, is uſeful for bread. The panicles are uſed in Sweden for dying green.

Couch Graſs:

Too common every where!

But this plant has its uſes and its virtues. The roots, dried and ground to meal, have been uſed to make bread in years of ſcarcity. Dogs eat the leaves as an emetic. *Boerhaave* recommends the juice to be drunk liberally in obſtructions of the viſcera, particularly in caſes of ſchirrous liver, and jaundice.

jaundice. Cattle who have ſchirrous livers in winter, ſoon get cured by eating it in the ſpring.

Burnet

Is ſo luxuriant as to allow three mowings in a ſeaſon. The young ſhoots make an agreeable ſallad. The green leaves give a grateful flavour to wine.

Gooſe Graſs; i. e. Yellow Ladies' Bedſtraw.

The flowers will coagulate boiling milk, and the beſt Cheſhire cheeſe is ſaid to be prepared with them. They yield an acid by diſtillation. Boiled in allum-water, they tinge wool yellow. The roots dye a fine red, not inferior to madder, and in the iſland of Java are uſed for this purpoſe. The ſeeds may be uſed inſtead of coffee.

Holly

Makes an impenetrable fence, and bears cropping. Sheep are fed in the winter with the croppings. Birds eat the berries. The bark fermented, and then waſhed from the woody fibres, makes the common bird-lime. The beauty of its ſcarlet berries never ſuffers from the ſevereſt of our winters. The wood is excellent for veneering, and is ſometimes ſtained black to imitate ebony. Handles for knives, and coggs for mill-wheels, are made of it.

Gromwell;

Gromwell; i. e. Baſtard Alkanet;

In corn fields common. The girls in the Northern parts of Europe paint their faces with the juice of this root on days of publick feſtivity. The ſeeds are hard as bone, and effervesce with acids. The bark of the root tinges wax and oil of a beautiful red, ſimilar to that which is attained from the root of the foreign alkanet kept in ſhops.

Borage.

By the experiments of *Marggraff, Mem. de Berlin,* p. 72, it appears, that the juice of this plant affords a true nitre. The young and tender leaves are good in ſallads; but it is moſtly uſed as an ingredient in cool tankards.

Bindweed, [*Convolvulus Major.*]

The root is a very acrid purgative to the human body, but hogs eat it in large quantities without ſuſtaining any injury. Scammony is the inſpiſſated juice of a ſpecies of Convolvulus ſo much reſembling this, that they are not eaſily diſtinguiſhable. Can it then be worth while to import ſcammony from Aleppo, at a great annual expence, when a medicine with the very ſame properties grows ſpontaneouſly in many of our hedges? Might it not be worth the Society's attention to offer an Honorary Premium for making ſcammony from this plant?

Dwale, i. e. Deadly Nightſhade,

Is a plant rankly poiſonous throughout. Children, allured by the beautiful colour of the berries, have often fatally eaten them. They cauſe a ſtupor and delirium, to which ſucceed convulſions and death, if not prevented by timely and ſtrong emetics. It has been ſucceſsfully uſed in cancerous caſes. See *Ray*, and *Phil. Tranſact.* vol. 50, p. 77.

Buck-Thorn.

The ſyrup is uſed as a purgative, but frequently attended with much ſickneſs and griping. The juice of the unripe berries is uſed for ſtaining maps or paper yellow. The juice of the ripe berries mixed with allum, is the ſap green of the painters; but if they are gathered late in autumn, the juice is purple. The bark affords a beautiful yellow dye.

Ivy.

The roots are uſed by leather-cutters to whet their knives upon. The ſmall branches ſtuck over the branches of wall-fruit in February, are the beſt preſervative againſt froſt affecting the bearing bloſſoms. The leaves are often given to ſheep in deep ſnows.

Madnep, i. e. Cow's Spondylium, Cow Parſnip.

The poor people in Poland prepare a liquor from the leaves and ſeeds, which, when it has undergone

undergone a fermentation, is drunk inſtead of ale. The ſtalks when peeled, are eaten by the inhabitants of Kamſchatka. The Ruſſians take the leaf-ſtalks of the root-leaves, peel, and hang them up in the ſun to dry a little; then they tie them up again until they become yellow; in this ſtate they put them into bags, and a mealy ſubſtance like ſugar forms upon the ſurface; this they ſhake off, and treat their gueſts with as a great delicacy.

Elder.

The whole plant is a narcotic. The inner green bark is purgative—in ſmall doſes diuretic, and has been of eminent ſervice in dropſies and obſtinate glandular obſtructions. If ſheep that have the rot are placed in a ſituation where they can get at the bark and young ſhoots, they will ſoon cure themſelves; therefore it is worthy of propagation.

Chickweed.

The young ſhoots and leaves when boiled, can ſcarcely be diſtinguiſhed from ſpring ſpinage, and are equally wholſome. This is one of the ſleeping plants.

The Barberry, or, Pipperidge Shrub,

Is excellent for quick fences in paſture lands. The berries are ſo very acid, that birds will not eat them; but when boiled with ſugar, make an excel-

lent rob or jelly. The roots boiled in lye, dye wool yellow. In Poland, they dye leather of a moſt beautiful yellow with the bark of the root. It is ſaid to be prejudicial to corn-lands.

Heath—Erica,

Common on lofty barren hills, and though little regarded, might be made to ſerve many valuable purpoſes. In the Highlands of Scotland, the poor inhabitants make walls for their cottages with alternate layers of heath, and a kind of mortar made of black earth and ſtraw. They alſo make beds of it; and their houſes are thatched with it.

In the iſle of Ilay, ale is made by brewing one part malt, and two parts of the young tops of heath.

Woollen cloth boiled in allum water, and then in a ſtrong decoction of the tops of heath, comes out a fine orange colour.

The ſtalks and tops will tan leather. Bees extract great quantities of honey from the flowers, which are very beautiful.

Wild Roſes.

The ripe fruit makes a pleaſant rob. The juice diluted with water dyes ſilk and muſlin of a peach colour; with the addition of allum, a deep violet; but it has little effect on woollen or linen.

The

The Lime-Tree

Flouriſhes beſt on the ſides of hills, is eaſily tranſplanted, and graſs grows well beneath it. It is very ornamental for clipped and ſhady walks. The wood is ſoft, light, and ſmooth; cloſe grained, and not ſubject to the worm. It makes good charcoal for gunpowder and for deſigners. It is uſed by turners, carvers, and leather-cutters. In ſome countries, the leaves are dried as a winter food for ſheep and goats. Cows eat them in autumn, but they give a bad taſte to the milk. The bark, macerated in water, may be made into cordage and fiſhing nets. The flowers afford the beſt honey for bees. The ſap, when inſpiſſated, yields a quantity of ſugar.

Larkſpur.

The expreſſed juice of the petals, with the addition of a little allum, makes a fine blue ink. The ſeeds are acrid and poiſonous.

Ground-Ivy.

The leaves thrown into the vat with ale, clarify it, and give it an antiſcorbutic quality. The expreſſed juice mixed with a little wine, and applied morning and evening, deſtroys the white ſpecks on horſes eyes.

The Milk Thiſtle

Is eaten young as a ſallad. The ſtalks peeled, and ſoaked in water to take out the bitterneſs, and then boiled, are excellent. The ſcales of the cup are as good as artichokes. The root is good to eat early in the ſpring.

The Beech Tree

Is large and beautiful, but no verdure will flouriſh under it. It is difficult to tranſplant, and loves a fertile ſoil; bears lopping well, and may be trained to form lofty hedges. They wood is brittle, and ſoon decays in the air, but endures under water. It is formed into tool-handles, planes, mallets, chairs, and bedſteads; when burnt, it is excellent fuel, and yields a large quantity of pot-aſhes. The leaves gathered in autumn, before they are injured by froſts, make far better mattraſſes than either ſtraw or chaff, and endure for ſeven or eight years. The nuts or maſts, when eaten, give the head-ache; but well dried and powdered, make wholſome bread. They are ſometimes roaſted and ſubſtituted for coffee. In *Sileſia*, the poor people uſe the expreſſed oil inſtead of butter. They are excellent for fattening ſwine.

The Scotch Fir

Flouriſhes beſt in a poor ſandy ſoil. In groves, the trunk becomes tall and naked; in open ſunny ſituations,

ſituations, branched; on rocks and bogs, it ſeldom grows to a large ſize. In black ſoil, it becomes diſeaſed; and in chalky land it dies. Sometimes it will thrive near running, but never near ſtagnant waters. The roots ſpread near the ſurface of the earth, except the central root, which grows perpendicularly downwards; and if this be broken off, or interrupted in its paſſage by rocks, the ſtem ceaſes to ſhoot upwards, and the tree ever remains a dwarf.

This tree furniſhes us with the beſt red or yellow deal. Its bark will tan leather. The Northern nations make bread from this tree in the following manner:—They chooſe a tree whoſe trunk is even, (for theſe contain the leaſt reſin) and ſtrip off the bark in the ſpring, when it peels moſt eaſily. This they firſt dry gently in the ſhade, then in a greater heat, and reduce it to powder; with this powder, they mix a ſmall quantity of meal, and with water knead it into bread. This they eat in common. The young ſhoots diſtilled, afford a fragrant eſſential oil.

Willow, and Poplar.

The common uſes of theſe trees are well known; but that ſpecies called *Abele*, or *Populus Alba*, (common in woods and hedges) deſerves particular notice, on account of the virtue its bark poſſeſſes in

in curing intermitting fevers. The Rev. Mr. *Stone*, in *Phil. Tranſact.* vol. 53, p. 195, tells us, that he gathers the bark in ſummer when it is full of ſap, and having dried it by a gentle heat, gives a dram powdered every four hours betwixt the fits. In a few obſtinate caſes, he mixed one-fifth part of Peruvian bark with it.

It is remarkable how nature has adapted remedies to diſeaſes. Intermitting fevers are moſt prevalent in wet countries; and this tree grows naturally in ſuch ſituations. The bark of it is an object well worthy the attention of phyſicians; and if its ſucceſs, upon a more enlarged ſcale of practice, prove equal to Mr. *Stone*'s experiments, the world will be much indebted to him for communicating them. This bark will alſo tan leather.

Pillitory of the Wall.

The leaves of this plant, ſtrewed in granaries, deſtroy the weevil in corn.

Many of the above hints may poſſibly appear trifling; but when it is remembered, that the aggregate of human knowledge conſiſts of minute parts, which though abſtractedly conſidered appear of little conſequence; yet when relatively viewed

viewed in their connection with the whole, they acquire ſufficient importance to claim attention and regard from the publick.

I have the honour to be,

Your very humble ſervant,

Frome, March 16, 1785. A. CROCKER.

Article III.

The Rev. Mr. Onley's Mode of cultivating his Farm.

[In a Letter to the Secretary.]

THE exact attention of the Bath Agriculture Society to the principles of their very excellent inſtitution, could not be more ſtrongly proved, than by the honourable notice they have condeſcended to take of the trifle I took the liberty of ſubmitting to Mr. Young. I ſhall be happy by furthering any enquiries they may wiſh to make in this neighbourhood; in which, on farms of a moderate ſize, agriculture in a plain method is perfectly underſtood, and with hard labour and moderate gain very diligently followed.

To

To aim at meriting the compliment I have received, whether I can be of any ſuch ſervice, will be beſt conjectured by an account of my uſual management of ſeventy acres; though it will probably leſſen very much any opinion of my capacity as a farmer, when I acknowledge that forty of theſe are conſtantly in paſture, and the other thirty only cultivated as ſubſervient to grazing, by producing the neceſſary ſtover and artificial paſture for the troubleſome cravings in winter and ſpring. Amuſement on this ſimple but rough plan is united with great conveniency, at moderate expence, little attention, and no material hazard. The thirty acres of arable are in four fields; and if a compleat year's fallow does not follow the wheat crop, (which is here occaſionally neceſſary even to the neateſt farmer towards purifying the ſoil, and which by leaſe is never permitted to go beyond a third crop, turnips and clover excepted) my routine is or may be, from the manure I can afford, if I am not out of humour at a little extra trouble, as follows:—

As ſoon as poſſible after the wheat is off, the ſtubble is mown, and ſtacked for littering the cow-yard in winter, the field ploughed, and half of it ſown with two buſhels of ſmall black winter tares, and one buſhel of rye; the other half is well fallowed

fallowed and dunged, as opportunity and the ſeaſon permit, till Midſummer, when either turnips are ſown or cabbages planted on it; and the tares being by that time entirely fed off, are ploughed in, and occaſionally during the ſummer fallowed, and dunged if neceſſary, as the other half was during the ſpring. In the following ſpring, the turnips or cabbages being fed or carted off by March, this field is, at once-ploughing, ſown with oats or barley, and one buſhel of ray-graſs, and half a peck of clover-ſeed, per acre. This large portion of ray-graſs ſeed renders the feed of it much finer, brings it earlier, and, as it ought never to be permitted to run to any luxuriancy, removes every prejudice againſt it.

When the corn is off, a ſmall quantity of dung, if it can be afforded, will contribute to bring this excellent paſture ſufficiently forward for cattle—at the lateſt in the very beginning of May the following year; from which period, it is *continually* depaſtured on till nearly the end of September, when, at once-ploughing, wheat is ſown on the field; and the rotation commences again.

Having thus the four years' cultivation of one field, you have the ſtate of annual crops of my four fields; the great conveniency of which is, to a gen-

a gentleman—as ſubſervient to his graſs land, which any attentive gentleman can manage as well as the beſt common farmer—that the corn-land produces or buys oats, and wheat-chaff, and ſtraw, for the ſtable; oat-chaff, and ſtraw, for the dry cattle; and ſtubble-ſtraw, for littering down the cow-yard;—turnips or cabbages, as green provender for milch or fattening cattle from December to the end of March;*—tares from thence to May;—and ray-graſs, till natural paſture is in full luxuriancy.

To me, who ſeldom keep ſheep, and only take in oxen for *ſummer feed*, this *exact* ſucceſſion of vegetables is not eſſential; to thoſe who do, it is highly ſo; but I always have ſuch a portion of it, as to keep the dairy in full milk. As turnips are a troubleſome crop on lands that are heavy and moiſt; and cabbages, I gueſs, a wearing one;† on ſuch it is more convnient to ſow immediately after the wheat the *whole* field with rye and tares for only very early ſpring feed; and leave a paſture-field

* Mr. Onley has not given an account of the application of the rye ſown at the ſame time with the tares. We conclude it is fed off as ſoon as the turnips are finiſhed, as it affords feed for cattle before the earlieſt ſpring graſſes or tares, and is conſtantly ſown for that purpoſe in many parts of Suffolk and Norfolk, and the land is fallowed for a turnip crop after the rye has been fed off once or twice.

† This would be in ſome degree compenſated, if the manure made by the cattle while fed with cabbages in the ſtraw-yard, were all carried on the field. Till this be done, or allowed for the eſtimate, a comparative calculation cannot be fair, becauſe when turnips are *fed off* by cattle, (which is never the caſe with cabbages) the field is greatly enriched by the manure they make upon it.

unfed

unfed from September to December, to afford (which in general it will do) good rough feed for the cattle a few hours every day in the winter, till the tares are ready to receive them. By the tares and rye being thus early fed off, the field is not only well manured in the eafieft mode, but the paſturage at that critical ſeaſon is ſufficiently valuable to anſwer the expence of the whole year's fallow; which with us, heavy lands, eſpecially if intended for *barley* in the following ſpring, muſt have. In ſuch circumſtances, expenſive as tare-ſeed is, this little crop (even at *once* feeding, in order that the fallowing the field may commence with May) is valuable even to a common farmer.

Where gentlemen will afford the neceſſary attention, the drill and horſe-hoeing huſbandry is, in point of elegance at leaſt, their peculiar province; but as the expence of it is, I conclude, on any conſiderable ſcale very great,* and exactneſs peculiarly neceſſary, it is improbable that it ſhould exceed in profit the uſual huſbandry; where, by a rotation of graſs, pulſe, and corn crops, all equally eſſential, and an oppoſite ſpecies always ſucceeding to another, the land is never ſurfeited by fameneſs; the cultivator ſubject to little diſappointment, ſome

* The expence is much leſſened by divers excellent machines lately introduced into practice, ſome of which will be deſcribed in courſe of this work.

portion

portion of his crops making up for the failure of others; and the farmer with his plain inſtruments, gradually drawn into a degree of hoeing culture.

But as produce is too frequently very diſtinct from profit, a ſeries even of ſuch crops will on much land, from the expence of hoeing and manure, not equal a ſhorter circle with intervening fallows. On light lands proper for turnips, little ploughing is neceſſary to pulverize the ſoil, but much manure neceſſary to maintain its vegetation; on a heavy ſoil, little manure is neceſſary for the latter, but much ploughing for the former; yet the barley crop following the fallow on the heavy, will fully equal in value the joint one of the turnips and barley on the light ſoil.

A general ſeries of crops can never without much exception be laid down; variety in the ſeries, and the utmoſt cleanlineſs in ſupporting it, are every where eſſential; but what ſhould be that ſeries at the leaſt expence and moſt profit, depends on ſuch local circumſtances as muſt be left to the immediate farmer. As to the ploughing with four or five horſes at length with a heavy plough, when a light one and a pair of good horſes abreaſt are equal to the heavieſt ſoil; the throwing away a large portion of ſeed in order to enſure a crop, and

refuſing

refuſing to hoe for fear of leſſening it; ſuch abſurd practices ariſe from a barbarous obſtinacy, that nothing but ridicule enforced by an oppoſite example can cure; and that can riſe only from gentlemen undertaking to give an experimental proof; and, on the moſt meritorious plan of the Bath Society of Agriculture, amply rewarding the laborious that will purſue the returns of induſtry, the ingenious that will try the hazard of experiment, and the ignorant that will ſubmit to conviction.

I am, Sir,

Your very obliged ſervant,

Stiſted-Hall, Eſſex,
June 29, 1784.

CHA. ONLEY.

Cultivation, Expence, and Profit, of One Acre, Arable, for four Years.

Years.	*Expence.* £.	s.	d.	*Years.*	*P.* £.	s.
1ſt.				*1ſt.*		
Sowing, tilth, &c.	0	4	0			
Tares 2 buſh. rye 1 buſh.	0	13	0	Rye and tare-ſeed	1	1
Fallowing-tilths	1	0	0			
Rent, rates, tithe	1	1	0			
2d.				*2d.*		
Sowing, tilth, &c.	0	4	0			
Seed-oats 4 buſhels	0	8	0	Oats 5 quarters at 16s.		
Harveſting	0	5	0	per quarter	4	0
Rent, rates, tithe	1	1	0			

3d.				*3d.*		
Ray-graſs and clover-ſeed						
ſown with oats	0	5	0	Ray-graſs and clover-ſeed —	2	0 0
Rent, rates, tithe	1	1	0			
4th.				*4th.*		
Sowing, tilth, &c.	0	6	0			
Seed-wheat 2 buſhels	0	10	0	Wheat 3 quarters at 2l.		
Hand-hoeing —	0	5	0	per quarter —	6	0 0
Harveſting —	0	6	0			
Rent, rates, tithe	1	1	0		13	10 0
	8	10	0		8	10 0
				NETT PROFIT £.	5	0 0

The haulm, ſtraw, and chaff, are preſumed to pay for threſhing the corn; and the land, being in the graſs-years fed, to require little, if any dung. If the land be light, turnips or cabbages will be more profitable than tares and rye, but will require a large portion of dung. For mere conveniency a mixture of theſe crops is moſt eligible. Barley will certainly pay better than oats; and if a compleat fallow be taken, without *any* feeding crop, as requiring ſo much leſs trouble, ſhould probably be preferred; though the ſtraw is much leſs valuable for the feed of cattle in winter, than that of oats. The hand-hoeing of wheat in the ſpring is undoubtedly expenſive; but if the plant be thick and forward, it may ſafely be *ſheep-fed*, and then harrowed and hoed; and this, beſides *ſome* ſecurity againſt mildew, affords a little advantage to thick-ſown wheat. C. O.

ARTICLE

Article V.

An Account of Glauber's Salt, extracted from the Rubbiſh of an old Furnace.

[By the Rev. George Swayne, Pucklechurch.]

SINCE a peruſal of Dr. Watſon's very elegant Eſſays on Chemiſtry, my curioſity has led me to examine ſeveral matters with an eye of analytical enquiry, which before had ſcarce attracted a ſuperficial notice.

Among theſe, as I was one day looking round a ſteam-engine which has long been erected at the coal-works in this neighbourhood, I perceived the bricks and mortar ſurrounding the furnace to be very fully impregnated with a ſubſtance which from its appearance I judged to be ſaline. From the circumſtance of the above-mentioned ingenious author extracting a true nitre from the mortar of an old barn, it immediately occurred to me, that this ſubſtance could be no other than ſuch nitre, particularly as it appeared in many places already cryſtallized. Workmen were at that time removing the furnace, which was in a ſtate of decay, in order to ſubſtitute a new one in its place. I took home with me a ſmall quantity of the rubbiſh, and examined it by the uſual analyſis. The quantity ex-

amined was twenty ounces. Having elutriated the maſs ſufficiently with hot water, filtered and evaporated the ſolution till a pellicle was forming on the ſurface, I ſet it by to ſhoot; when it had ſtood a ſufficient time, I found plenty of the moſt beautiful priſmatic cryſtals depoſited. But I was not a little ſurprized to find that theſe when committed to the fire would not deflagrate; whereupon, taſting this ſubſtance, I concluded it to be not ſalt-petre, but that ſpecies of ſalt which is termed by chemiſts *Sal Mirabile*, or Glauber's Salt. The quantity of ſaline matter obtained from the whole ſolution weighed ſix ounces.

On farther conſideration, it does not ſeem difficult to account for the production of one of the conſtituent parts of Glauber's ſalt in the place where this was found. It is well known to chemiſts that the acid of ſulphur is the ſame as the acid of vitriol, and that this acid is one of the eſſential parts of Glauber's ſalt. Pit-coal contains a large proportion of ſulphur. The acid, I apprehend, is ſublimed in the fire, and meeting in its aſcent with the ſteam which is conſtantly evaporating from the furnace, becomes condenſed, is precipitated, and imbibed by the abſorbent matter of which the walls are compoſed. To account for the other conſtituent part does not appear to me quite ſo eaſy.

eaſy. Pit-coal however, it is certain, contains ſome ſmall proportion of the foſſil alkali, which, though fixed in a leſs degree of heat, may be rendered ſomewhat volatile; that is, may be expelled to ſome conſiderable diſtance by that intenſe degree of heat which uſually melts the aſhes, and converts them into glaſſy ſcoriæ.

The water likewiſe which is drawn from coal-mines is, I am told, ſomewhat brackiſh; if ſo, conſequently it contains ſea-ſalt. This water, after being elevated, is conſtantly dropping from the furnace, and different parts of the engine, on the walls and ground beneath; where, if it found the condenſed vitriolic acid, which is more powerful than the marine, the latter would be expelled, and the former attaching itſelf to the alkali, their union would produce the neutral ſalt in queſtion. I am not quite ſatisfied with this ſuppoſition reſpecting the alkaline part of the compoſition, as I cannot conceive that even both ſources from whence I have ſuppoſed the alkali to proceed, could furniſh any conſiderable quantity. It is a fact, however, that a ſalt is produced in the ſituation I have deſcribed, which I take to be a true Glauber's ſalt. I have ſent you a ſpecimen; and could wiſh to have it examined by a perſon of more knowledge in theſe matters than I can pretend to.

If I might judge from the preceding analyſis, there could not be leſs than half a ton of this ſalt collected in the rubbiſh which ſurrounded the furnace, and was then removing. Such a quantity, one would apprehend, muſt be of conſiderable value; eſpecially as it might be eaſily extracted with very little expence; hot water for the ſolution being always ready on the ſpot, and even conſtantly flowing to waſte, whenever the engine is at work. Suppoſing this ſubſtance to be a true and genuine Glauber's ſalt, I think there may be methods found out for collecting and increaſing it, which would make it an object to the proprietors of ſteam-engines, well worth their attention.

Dr. FOTHERGILL being preſent at the meeting when the above letter was read, at their requeſt examined the ſamples of ſalts, and ſent in the following

REPORT.

GENTLEMEN,

Agreeable to the Society's requeſt, I have examined the ſpecimen of the ſalt which your ingenious correſpondent, Mr. Swayne, obtained from the mortar and brick-work of a coal-engine; and find it to poſſeſs the following properties:—

It has a peculiar bitter taſte, like that of Glauber's ſalt; like that too, it has hexangular priſmatic cryſtals, eaſily ſoluble in water, fuſible in the fire, and calcinable in the air. A ſolution of it does not alter the ſyrup of violets, or tincture of litmus;—undergoes no precipitation from acids

acids or alkalies; nor can it be decompoſed but by the addition of phlogiſton;—becauſe having the mineral alkali for its baſis, the vitriolic acid (being the other ingredient in its compoſition) cannot be detached from it by any other means. From theſe circumſtances, I conclude, there is no doubt of its being a native Glauber's ſalt.

On adminiſtering it internally, to the amount of ſix drams in half a pint of warm water, it operated mildly three or four times, without producing nauſea, ſickneſs, or griping. This was repeated twice in two different perſons alternately, with an equal quantity of the common Glauber's ſalt of the ſhops, and was allowed by both perſons to be leſs nauſeous, and more eaſy and pleaſant in its operation. Nor is this to be wondered at, as the common Glauber's ſalt is often found not perfectly neutralized, having a portion of redundant vitriolic acid, which renders it offenſive to the ſtomach and bowels. Whereas this native ſalt is free from that inconvenience, and operates with equal mildneſs as the purging ſalt which I lately obtained from Cheltenham water.

In order to obtain the preſent ſalt in its moſt perfect ſtate of cryſtallization, the water in which it is diſſolved ought to be evaporated very leiſurely, and not too far, becauſe a conſiderable portion of water is eſſential to the form and tranſparency of the ſalt.

From the imperfect ſtate of the ſpecimen which you ſent me, the cryſtals ſeem to have been deprived of their due quantity of water; and this is ſtill more evident in the ſample which Mr. Swayne terms "a more refined ſort."

I am, Gentlemen,

Your very obedient ſervant,

Walcot-Parade, Bath, A. FOTHERGILL.

Sept. 17, 1782.

Article VI.

On the Application of Chemiſtry to Agriculture, and Rural Œconomy.

[By A. Fothergill, M. D. F. R. S. Bath.]

Hæ tibi erunt artes.——— Virg. Æneid, lib. vi.
Verè ſcire eſt per cauſas ſcire. Verulam.

AGRICULTURE is undoubtedly the moſt ancient and honourable of all the arts, ſince it dates its origin from the higheſt antiquity, and appears to have been coeval with the firſt parents of the human race. Though it has received all the improvements of a long ſucceſſion of ages down to the preſent time, whence is it that its progreſs towards perfection has been much ſlower than that of many others of a far more modern date?—The chief cauſes which have retarded its advancement, ſeem to be the three following:—

Firſt, The extreme difficulty of the ſtudy of Agriculture.

Secondly, The want of proper Maſters to unfold its principles, as in other branches of Experimental Philoſophy. And,

Thirdly, The great reluctance of Farmers to quit the beaten track.

So

So complex is the ſtudy of Agriculture, that it involves a multiplicity of objects of the moſt abſtruſe and recondite nature, which never can be thoroughly underſtood without a previous knowledge of many other arts, and particularly of Chemiſtry. And yet this important ſcience has been uniformly committed to the ſole management of the illiterate part of mankind. Theſe being unable to learn, for want of perſons qualified to teach, have obſtinately purſued a routine of random practice, in imitation of their forefathers, without any ſettled principles. Innumerable errors have thus been tranſmitted from one generation to another, under the fallacious appearance of being the reſult of long experience. Can we wonder then that the theory and practice of agriculture are yet far, very far, from having reached the ſummit of perfection? Chemiſtry indeed has not till of late years been applied to agriculture and the œconomical arts, though the principal operations of each evidently depend on chemical principles.

It is not to be expected that every huſbandman ſhould be a profound chemiſt; but I will venture to ſay, that every gentleman who wiſhes to improve his eſtate, and to advance the art of agriculture, ought to be well verſed, at leaſt, in the principles of philoſophical chemiſtry; without which he

he can neither conduct experiments properly, nor explain the ſeveral phenomena ſatisfactorily which reſult from them.

The uſes which chemiſtry may be of in agriculture are great and extenſive, but my preſent bounds will only permit me briefly to mention a few of them.

To this art it belongs, to diſtinguiſh the ſundry kinds of earth, according to their natures and proportions;—to determine which of them are the fitteſt for different purpoſes;—to aſcertain the different qualities of the various ſorts of manures, and to point out proper methods of applying them;—to diſcover the beſt method of improving a barren ſoil;—to effect by a ſuitable mixture of earths, what is not to be accompliſhed by manure alone.

The earths which moſt commonly occur are clay, ſand, and calcarious earth, none of which alone is adapted to the ſupport of vegetables. Hence in a good ſoil, they are therefore generally found mixed, at leaſt two of them, together with a portion of decayed vegetable ſubſtances.

Clay retains moiſture the beſt; after clay, calcarious earth; ſand dries rapidly. Hence it follows,

lows, that from the different proportions in which they are mixed, reſult ſo many different capacities for retaining water. Hence too the inferior as well as ſuperior ſtrata of the ſoil ought to be examined, as well as the mean ſtate of the weather with reſpect to drought or moiſture, and opportunities of watering, &c. For the beſt ſoil will prove ſterile without a due proportion of moiſture.

To render land capable of producing a ſmall crop of grain, requires no great ſkill; but to cauſe it to yield the greateſt poſſible crop, demands no common management. Is it not diſgraceful to behold the execrable huſbandry which prevails in ſome parts of this opulent county, where it is no unuſual thing to ſee corn and weeds ſtruggling together for the ſuperiority, till the latter, gaining the aſcendancy, ſtifle the meagre crop, and ſpread triumphantly over all the neighbouring grounds!

To chemiſtry it appertains to ſuggeſt ſuitable means for preſerving grain from ſmut, blights, or mildew; alſo for deſtroying, or driving away inſects, reptiles, and other noxious vermin, which are wont to prey on fruits, ſeeds, or vegetables.

When the products of agriculture are at length obtained, the aid of chemiſtry is ſtill eſſentially neceſſary

neceſſary towards their preſervation, and the means of fitting them for the various purpoſes to which they are deſtined.

Grain, and farinaceous vegetables, are convertible into flour, bread, ſtarch, malt, &c. In proportion to the ſaccharine matter contained in them, they become ſubjects of the vinous and acetous fermentation, and hence the operations of baking, brewing, the making of wine, cyder, vinegar, &c. are ſo many chemical proceſſes; which, for want of the requiſite ſtock of knowledge, in many caſes either fail altogether, or are carried on with little advantage.

The preparation of flax and hemp for ſundry uſes, and the operation of bleaching and whitening linen; alſo of preſerving wood from putrefaction, and preparing other vegetable productions for various œconomical purpoſes, depend all on chemical principles.

The productions of the animal kingdom afford a variety of raw materials which enrich the farmer, and which by ſuitable management conſtitute no inconſiderable ſhare of the national wealth. Such as meat, eggs, milk, butter, cheeſe, honey, wax, tallow, hides, &c. All which, by chemical art,

may

may be preſerved in a ſound ſtate for a conſiderable length of time, or even ſometimes reſtored, in a great meaſure, after corruption has begun to take place. They may alſo be further improved, and converted to a variety of œconomical uſes to the higheſt advantage, if their chemical properties are properly underſtood.

An eminent author has very juſtly obſerved, that the application of chemiſtry to arts and manufactures, is an object of a very intereſting and extenſive nature; becauſe many of them conſiſt of a ſeries of chemical proceſſes from beginning to end, others only in certain ſtages; the reſt being performed by mechanical operations. Though arts and manufactures might owe their firſt origin to chance, or random experiments, yet the improvement and perfection of them muſt ultimately depend on certain facts, and principles, which it is the province of chemiſtry to illuſtrate and explain.

Private intereſt indeed has long checked the progreſs of the arts, and ſelfiſhly monopolized the moſt lucrative employments, by caſting a veil of ſecrecy over the different proceſſes; but chemiſtry aſſiſts us in drawing aſide the veil, and oftentimes too in accompliſhing the end, by more ſimple and efficacious means.

In

In ſhort, from the foregoing obſervations it appears, that both in public and private manufactories, and various articles of rural œconomy, a multitude of operations are continually going on, which undoubtedly depend on chemical principles. It were therefore earneſtly to be wiſhed, that an accurate inquiry into the preſent ſtate of the arts throughout the kingdom were to be undertaken, and repeated at certain intervals, with a view towards their improvement. This would ſupply many curious and uſeful facts, which before were not known, except in manufactories. Chemiſtry in its turn would unfold the principles on which the various operations are founded, concerning which even the artiſts themſelves are generally obſerved to be groſsly ignorant.

It ſeems evident, that no material change can be wrought in bodies, but either by ſeparating ſomething from them, or combining ſomething with them; but it is by chemical attraction, that both ſeparation and combination are performed. Conſequently it is from the accurate knowledge of chemical laws, that the cleareſt lights, and ableſt aſſiſtances, are to be obtained.

Knowledge, ſays the illuſtrious VERULAM, is incomplete, and ſcarcely deſerves the name, unleſs it enables us to explain the ſeveral phenomena.

Is

Is it not ſurprizing then, conſidering the rapid progreſs which chemical ſcience has been making for ſome years paſt, that its profeſſors have not till very lately pointed out its applications to the improvement of agriculture, and rural œconomy? The late ingenious Dr. Lewis, in his Philoſophical Commerce of the Arts, ſuggeſted many uſeful hints towards the improvement of various arts and manufactures by chemical inquiries: And it is much to be regretted, that theſe have not been purſued, and extended by his ſucceſſors, with a particular reference to agriculture.

A courſe of lectures on this plan, delivered in a plain, familiar ſtyle, would be a great national acquiſition, and convey the moſt intereſting information to various ranks of men, and particularly to the country gentleman, the intelligent farmer, and curious artizan. Few there are, it is hoped, but will readily ſpare a ſmall portion of the time that is generally devoted to the bottle or the chace, to partake of ſo uſeful, ſo elegant an amuſement.

If a ſcheme of this nature ever was neceſſary, it ſeems to be peculiarly ſo at this juncture. Since we have been ſtript of our American colonies, and many ſources of our wealth and commerce been diverted into other channels, it ſurely behoves us to employ

employ thoſe which remain to the beſt advantage. If any thing can ſtill enable us to ſupport our preſent enormous burthens, or maintain our national character, it muſt be *a ſtrict attention to the improvement of Agriculture, and uſeful Arts.*

While our jealous rivals the French, intent on theſe great national objects, are exerting every nerve to outſtrip us, by iſſuing royal bounties, and offering every flattering inducement that can kindle zeal, excite induſtry, or exerciſe ingenuity, ſhall we continue to indulge a fatal lethargy, and give ourſelves up to indolence and diſſipation?

Had one fiftieth part of the treaſure which has been annually expended in raiſing and ſupporting diſtant colonies, or even one thouſandth part of what has been ſtill more wantonly laviſhed away, in carrying on the late ill-fated, ruinous war, been devoted to this truly patriotic purpoſe, the advantages would have ſoon been very apparent, and would moſt amply have repaid the expence.

Great-Britain might then, with its appendages, have juſtly excited the envy of all the ſurrounding nations, and long remained unrivalled in arts, as well as in arms!

Walcot-Parade, Bath, A. FOTHERGILL.
Oct. 19th, 1785.

Article VII.

On the Half Huſbandry.

[By the Rev. H. J. Close, Trimley, Suffolk.]

THE following account of the culture and produce of a ſmall piece of lucern, and alſo the half crop of oats with the potatoes planted in the intervals, ſhall have at leaſt the merit of exactneſs, however unworthy of communication in other reſpects.

April the 30th, 1782; ſowed half a pound of lucern in a ſeed bed, the drills being drawn with a garden hoe, at ſix inches diſtance, and covered with a rake.

September the 24th following, took up the plants, cut the tap-roots off, leaving each root about three inches long, and tranſplanted them into a piece of good mixed ſoil land, containing two roods, ſixteen rods, leaving room for ploughing the intervals, as it was planted two feet two inches from row to row, and ten inches from plant to plant in each row.

In the year 1783, it yielded four crops, which were cut and given to the horſes in the yards, the weight

weight of which cannot be aſcertained; but in the year 1784, I had it all weighed, and kept an account of the produce, which was as follows:

Crops.	*Began cutting.*	*Finiſhed cutting.*	*Produce.*
			lb.
1ſt crop	May 17th	May 25th	3442
2d	June 28th	July 15th	5064
3d	Auguſt 2d	Auguſt 14th	4831
4th	September 7th	Sept. 14th	3698
The 5th crop was not half of it cut, the froſt ſet in ſo early, but the part that was cut produced - - - - - -			775
Set the part which was fed off at the ſame weight, though it certainly exceeded it			775
		The whole will amount to	18185

Or 8 tons, 2 hundreds, and 41 pounds of green food, from ſomewhat more than half an acre.

The lucern is now two feet high, and I have begun to mow it; though from the backwardneſs of the ſpring there is no other graſs even fit to turn into, and the whole neighbourhood is deſtitute of food for their cattle.

The experiment on the oats and potatoes was tried the ſame year. An acre of mixed loamy land was ploughed three times after a crop of cabbages, and on April 28th, 1784, half of it was ſet with the beſt Poland oats, planting two feet two inches, and

and leaving the ſame ſpace as intervals. May the 12th, thoſe intervals were ſplit with a double-breaſted plough, and planted with Champion potatoes. Auguſt the 29th, the oats were cut; and then threſhed, yielded ten coombs or five quarters of extraordinary large, heavy grain. October the 5th, the potatoes were ploughed up, and produced thirty ſacks of very fine potatoes, half of which were ſold at ſix ſhillings per ſack, and half at ſeven. The potatoe land was immediately planted with wheat, which now looks well, and promiſes to be my beſt crop.

The oat ſtubble, after having ſeveral ploughings, was, on the 16th of April laſt, planted with potatoes. The frame uſed for planting the oats had five tines or teeth in the two feet two inches. The expence of planting or hand hoeing either wheat or oats, is much diminiſhed ſince the practice was firſt introduced into this neighbourhood. By an account of mine tranſmitted to you by Sir Thomas Beevor, you will find 10s. an acre paid for planting wheat, with a ſeven-tined frame, and the ſame ſum for hand-hoeing; but I can now put it out at 6s. each per acre: uſing a frame with five tines makes only the difference of two women.

I ſhall add the produce of the acre of land thus cultivated.

	£.	s.	d.
The 30 ſacks of potatoes ſold for -	9	15	0
The 5 quarters of oats for ſeed -	5	5	0
	£.15	0	0

Add to this the advantage of having at leaſt half the land in good order for a crop of wheat, and I think it muſt appear a very advantageous method of culture. How the potatoes on the oat-ſtubble will ſucceed, I cannot form any judgment, as I never attempted to grow them after that grain. I have cultivated many acres of wheat and potatoes in the ſame method with great ſucceſs.

Your obedient ſervant,

Trimley, near Ipſwich,
May 17th, 1785. H. J. CLOSE.

P. S. Since the above was written, I have reduced the price of planting wheat or oats with the five-tined frame to 4s. 10½d. per acre. The potatoes on the oat-ſtubble produced 45 ſacks of 3 buſhels each from the half acre, and the wheat on the potatoe land was remarkably fine, and promiſes to be a very great crop, though it is not at preſent threſhed.

Jan. 20, 1786.

Article VIII.

On the Culture of the Buſh-Vetch.

By the Rev. Mr. *Swayne*, in a Letter to the Secretary.

Sir,

SEVERAL gentlemen at the laſt meeting, having expreſſed great ſurprize at the acreable account of the produce of a piece of lucern in ſome former ſeaſon, communicated by the Rev. Mr. Cloſe, I here ſend you a ſimilar account of the produce of an indigenous vegetable of this country in the preſent ſeaſon; a vegetable, which has hitherto, as far as I know, been uncultivated; but which, if I am not greatly miſtaken, would, under proper cultivation, prove a valuable addition to the farmer's Flora, and be in many reſpects of more value to him than that celebrated exotic, lucern.

The plant which the ſtatement reſpects is, the Buſh Vetch, [*Vicia ſepium*, Lin.] It is a plant of the claſs *diadelphia* of the Linnæan ſyſtem, the order *decandria*, the genus *vicia*: the ſixth ſpecies of Withering, and the ſeventh of Hudson. The root is perennial, fibrous, and branching; the ſtalks are many, ſome of them ſhooting immediately upwards, others creeping juſt under the ſurface of the ground, and emerging ſome near to, and others

at a conſiderable diſtance from the parent ſtock. The ſmall oval leaves are connected together by a midrib, with a tendril at the extremity; the flowers are in ſhape like thoſe of the common vetch, of a reddiſh purple colour; the firſt that bloſſom uſually come in pairs, afterwards to the number of four at a joint; the pods are much ſhorter than thoſe of the common vetch, larger in proportion to their length, and flatter, and are of a black colour when ripe; the ſeeds are ſmaller than thoſe of the cultivated ſpecies, ſome ſpeckled, others of a clay colour.

Being a perennial, it ſhould ſeem to be a very proper kind to intermix with graſs ſeeds for laying down lands intended for paſture; and that it is as juſtly entitled to this epithet as any herbaceous plant whatever, I think I may be allowed to affirm, having obſerved a patch of it growing in one particular ſpot of my orchard for theſe fourteen or fifteen years paſt.

It is not only a perennial, but an evergreen; it ſhoots the earlieſt in the ſpring of any plant eaten by cattle with which I am acquainted, vegetates late in autumn, and continues green through the winter, though the weather be very ſevere; add to this, that cattle are remarkably fond of it. Theſe

peculi-

peculiarities, it ſhould ſeem, would make it particularly valuable to the farmer as a green food for his ſheep in the winter and ſpring, when food of that denomination is ſo exceedingly ſcarce. Indeed I had often wondered within myſelf, what could be the reaſon that this plant had never found its way into general cultivation for this purpoſe; but ſince I have been acquainted with ſome peculiar circumſtances attending it, my wonder has ceaſed.

From theſe I collect, that the chief reaſon which has hitherto prevented its cultivation, has been the very great difficulty of procuring good ſeeds in any quantity. The pods, I find, do not ripen altogether; but as ſoon almoſt as they are ripe, they burſt with great elaſticity, and ſcatter the ſeeds around; and after you have procured the ſeeds, ſcarce one-third part of them will vegetate, owing to an internal defect, occaſioned by certain inſects making them the neſts and food for their young. Perhaps a detail of the circumſtances which led to this diſcovery, may not be unintereſting.

In the autumn of the year 1782, I collected a quantity of theſe ſeeds from the hedges, &c.—March 15th, 1783, I ſowed them in drills in a plat of ground in my kitchen garden, which meaſured exactly five yards ſquare; they were ſown in eight

drills, as thick in the drills as I would have ſown peaſe. They came up very thin and irregular; in ſome places there was more than a foot vacancy between plant and plant. This I was much ſurpriſed at, as the ſeed had been carefully preſerved during the winter, and I could not, from their appearance at the time of ſowing, ſuſpect them to be in the leaſt defective. The plants grew very ſparingly till towards the autumn, but before winter they made a tolerable appearance.

This plat is in the moſt expoſed part of my garden; the ſoil a blackiſh loam, rather ſtiff; it had been planted with potatoes the year before, for which I believe it was dunged, but am not certain; the two preceding years it was uſed as a nurſery for Lombardy poplars.

Early in July 1783, I collected ſome more of theſe ſeeds from the hedges, tied them up in a paper, and put them in a drawer of my bureau. Upon opening the paper in September, I obſerved a vaſt number of dead flies in it, and as many of the ſeeds with a ſmall hole in each. The number of the flies was 280. The whole number of the ſeeds 1080. Theſe flies, upon examination, proved to be a ſmall ſpecies of ichneumon. This puzzelled me not a little, as I had learnt that theſe inſects were termed

termed a race of cannibals, from their larvæ or caterpillars always feeding on other inſects. Upon which I opened many of the other ſeeds that had no holes in them, and in ſeveral of theſe diſcovered another inſect, alive, and in different ſtates of its growth. This proved to be the *bruchus piſi* of Linnæus, a near relation of the weevil [*curculio*] and the attelabus. From hence I ſurmiſed, that at the time when the buſh-vetch bloſſoms the female bruchus lays her egg within the bloſſom, and the ichneumon immediately after depoſits her egg in the ſame place.

After the froſts were over, I was much pleaſed to obſerve, that ſcarce a plant of my vetches had been killed by them, and their verdure very little injured. In April 1784, they had entirely filled up the ground, and were beginning to flower; at this time I found, as I expected, numbers of the bruchi intruding themſelves into the bloſſoms, before they were ſcarcely open, and the attendant ichneumones ready to follow them. I uſed every method I could think of to chaſe away theſe inſects from my crop, by ſtrewing ſoot over, kindling ſmoaky fires around, &c. but all to no purpoſe.

In the beginning of May the vetches were in full bloſſom, and it was amazing to ſee what a croud of

of inſects were ſwarming about them. At that time, I intended to preſerve the vetches for ſeed; but ſome time after, obſerving that they were beginning to rot from their over-luxuriance, I cut them, without taking any particular account of the produce. They were cut twice afterwards during the ſummer. Having remarked in general that the produce of theſe cuttings was very great, I was determined this year to keep a particular account.

Accordingly, March 16, 1785, I began to cut the vetches for the firſt time this ſeaſon. This cutting weighed green 16lb. I did not dry any part of it, but muſt ſuppoſe, that if dried, it would have weighed at leaſt one-fourth, as it was not near ſo ſucculent as any of the after-cuttings.

May 17th, they were cut a ſecond time, in full bloſſom, and weighed 130 pounds;—36lb. of the green fodder weighed when dry ſix pounds.

July 21ſt, they were cut a third time, and weighed 62lb.—33½lb. green weighed 8lb. dry.

Sept. 30th, they were cut the fourth time, and weighed green 72½lb.——15lb. green weighed 2½lb. dry.

The

The whole plat then of twenty-five ſquare yards produced,

	lb.		*lb.*	
1ſt cutting	16 green	ſuppoſed	4	dry
2d ditto	130 ditto, would have weighed		21½	dry
3d ditto	62 ditto, would have weighed		14	dry
4th ditto	76½ ditto, would have weighed		12½	dry
Total	284½ green		52	dry.

An acre therefore, (reckoning 4840 ſquare yards to the acre) in the ſame circumſtances, would have produced the total amount of

Tons.	*cwt.*	*qrs.*	*lb.*	
24	11	3	3	green
4	9	3	15	dry fodder.

N. B. Your are to recollect, that at the time the firſt cutting was made, there was ſcarce a green blade of graſs to be ſeen; and that the ſeaſon, till after the third cutting, was as unfavourable to vegetation as perhaps any in the memory of man.

Your obliged humble ſervant,

Pucklechurch,
October 13, 1785.

G. SWAYNE.

Article IX.

On the ſuperior Advantage of Dairy to Arable Farms.

[By Thomas Davis, eſq; of Longleat.]

Gentlemen,

EXPERIENCE ſufficiently evinces the extreme difficulty of perſuading *tenants* to believe that they get more (generally ſpeaking) by *feeding* their lands, than by ploughing them; yet it requires very few arguments to convince a *landlord*, that, in cold wet lands eſpecially, the leſs ploughed land you have, the leſs you put it in a *tenant*'s power to ruin your eſtate. That a tenant of 60l. per annum in a dairy farm will get money, while a corn farm of the ſame ſize will ſtarve its occupier,* (though perhaps the former gives 15s. per acre for his land, and the other but 10s.) is ſelf-evident;—not to mention, that not only the increaſed price of butter and cheeſe, but the difficulty in many pariſhes of getting even a pint of milk, an article ſo ſalutary and ſo neceſſary to ſubſiſtence in our early years, call aloud for every encouragement to be given to the pail.

The plough is a friend of every body's, though its advantages are very far from being particularly

* We perfectly agree with Mr. Davis, that this is the caſe in all ſmall arable farms.

and

and locally felt; corn being an article that will bear keeping till the whim or caprice, or ſuppoſed advantage, of its poſſeſſor call it forth. But the produce of the cow is far otherwiſe. Cheeſe muſt neceſſarily be ſold at a certain period; it is a ponderous article, and one-twelfth, or at leaſt fifteenth, of its value is often paid for carrying it to a fair fifty miles off; and the butter and ſkimm'd milk find their way no great diſtance from home, as is evident by the price of butter varying frequently one-third in twenty or thirty miles.

Every inhabitant of the city of Bath muſt be ſenſible, that butter and cheeſe have riſen one-third or more in price within twenty years. Is not this owing to the great encouragement given to the plough, and to grazing, at a time when, on account of the increaſed demand for milk, cream, butter, and cheeſe, every exertion on behalf of the dairy ſhould have been encouraged?

In Dorſetſhire, the farmers take *all* the cream from their cheeſe, and yet think it equally delicious to the rich kinds made in Somerſetſhire, where it is thought high treaſon to take any.—The difference at market may perhaps be five or ſix ſhillings; and yet I well know, that the butter thus ſtolen from the cheeſe is frequently equal to 12s. on every hundred weight of cheeſe.

Suppoſe

Suppoſe then the Society were to offer a premium† for the beſt courſe of experiments upon the comparative value of butter and cheeſe.

1ſt. Butter from new milk alone.

2dly. Butter from half new milk and half whey.

3dly. Butter from whey alone.

4thly. Cheeſe from new milk.

5thly. Cheeſe from half-ſkimm'd milk.

6thly. Cheeſe from all ſkimm'd milk.

But I am really aſhamed to have ſaid thus much to you, who are ſo much better judges, and muſt have long ſince made up your mind on every material branch of agriculture, and become acquainted with the comparative advantages and diſadvantages ariſing from the different modes of practice in different counties.

I am, &c.

Longleat. THOMAS DAVIS.

† The Society in their premiums this year [1785] have not been wholly inattentive to the very pertinent hints ſuggeſted by Mr. Davis; and they wiſh him to be aſſured, that his correſpondence will, at all times, be particularly acceptable.

ARTICLE X.

Remarks on the foregoing Letter.

[By JOHN BILLINGSLEY, eſq; of Aſhwick-Grove.]

SIR,

I HAVE peruſed Mr. Davis's letter with ſome conſiderable degree of attention; but muſt confeſs myſelf ſomewhat at a loſs how to form a premium on the management of a dairy. I perfectly agree with him in reſpect to the importance of the ſubject; but it is of ſo complicated a nature, that, I am of opinion, no ſettled invariable rules for the management of the dairy can with any propriety be eſtabliſhed. The vicinage of a city or conſiderable market-town; the reſidence of a populous neighbourhood; the nature of the paſture on which cows are fed; all contribute to dictate a variety of management, without an attention to which the farmer's profit will be undoubtedly diminiſhed.

In places where butter may be ſold throughout the year on an average at ſeven-pence or eight-pence per pound, I have found the moſt profitable method to be, that of making butter, and *half* ſkimmed cheeſe. In this way (on our land, which may be valued at from 20s. to 25s. per acre) ſix or ſeven pounds may be annually made from a good cow; allowing her the produce of two acres and a half

half for her ſummer and winter feed. The difference of price between this kind of cheeſe, and the beſt ſort, cannot be eſtimated at leaſt than 8s. per hundred weight. This declaration may probably ſurpriſe you, when you compare it with Mr. Davis's account of the Dorſetſhire method, where, he ſays, they "take all the cream from the cheeſe, "and yet the difference of price at market is only "5 or 6 ſhillings per hundred weight."

Perhaps there cannot be a ſtronger proof of the inferiority of the plough, with reſpect to profit, than the ſuperior punctuality of the dairy farmer in the payment of his rent. This obſervation, I believe, moſt ſtewards, who ſuperintend manors devoted partly to corn and partly to dairy farms, will verify;—at leaſt, I have never met with one who controverts it.

But perhaps the advocate for the plough will deſire me not to confound the abuſe of a thing with its intrinſic excellence—and ſay, that the generality of corn farmers are moſt egregious ſlovens;—that lands devoted to the plough are not confined to ſuch a mediocrity of profits as 20s. an acre;—that the produce of artificial graſſes (without which a well-managed arable farm cannot exiſt) far exceeds that of natural graſs, both in reſpect of quantity

and

and nutrition;—that the ſtraw-yard is a moſt convenient place of reception for the cow when freed from the pail. Theſe and many other reaſons may be adduced, to ſhew the propriety of walking in the middle path, and of judiciouſly blending *arable* with *paſture*, in the proportion perhaps of *three* of the latter to *one* of the former.

Sir Thomas Beevor's letter is a treat, for which I return you my moſt cordial thanks. In him we ſee happily combined the polite gentleman and the practical farmer. His method of cultivating turnip-rooted cabbages,† I have myſelf practiſed with great ſucceſs, and join with him in warmly recommending it to the notice of all farmers.

I am, &c.

JOHN BILLINGSLEY.

Aſhwick-Grove, Nov. 14, 1784.

Article XI.

On the Culture of Carrots.

[By John Kirby, eſq; in a Letter to the Secretary.]

I HAVE been favoured with your letter, enquiring after the method adopted in this county for the cultivation of carrots; and ſhall think myſelf

† See Article XVII.

parti-

particularly happy if the intelligence I am enabled to communicate upon that ſubject, ſhould be thought worthy the attention of your very reſpectable Society, or in the leaſt degre etend to promote the good intentions of ſo laudable an inſtitution.

The ſoil proper for the cultivation of this uſeful root is a ſandy loam, of about ſeven or eight ſhillings per acre; that on which I have uſually grown them is of a ſharper nature, and not ſo valuable. I have variouſly ſown them after turnips, ſummerland barley, and peaſe ſet upon a rye-graſs ley; the crop upon the firſt has generally been moſt productive; next to that I ſhould prefer the latter. In the firſt inſtance we feed off the turnips by the beginning of February, and then lay the land up on ſmall balks or furrows, in which ſtate it remains until the ſecond week in March, when it is harrowed down, double-furrowed to the depth of about twelve inches, and the ſeed ſown thereon, at the rate of four pounds and an half to the acre. As ſoon as the plants appear diſtinctly, they are ſet out with a ſmall hoe, at the diſtance of ſix inches from each other; they are afterwards hoed twice more at different times, according as the crop ſeems to require it; and it is not unuſual to harrow them between the hoeings, which does no injury to the root, and frequently ſaves the expence of a third hoeing: for

theſe

theſe three hoeings I commonly pay from fifteen to eighteen ſhillings per acre.

When carrots are intended to be ſown after peaſe, I uſually plough the ſtubble as ſoon as the harveſt is over, in order that the land may purge itſelf of weeds; in December it is laid up in ſmall balks to receive the benefit of the froſts; in February it is harrowed down, and manured at the rate of fifteen loads per acre; the manure is ploughed in to the depth of about four inches, and in the middle of March the land is double furrowed, and the ſeed ſown. By purſuing of this method, the manure lies in the centre of the ſoil, and not only affords nouriſhment and ſupport to the carrot in its perpendicular progreſs, but renders it eaſy to be turned up by a ſingle ploughing, and greatly promotes the growth of the ſucceeding crop of barley. With this crop I uſually lay down the land with rye-graſs, in which ſtate it remains for two years before it is again ploughed up, and ſometimes longer.

The carrots being fit to take up, I put them out to my labourers, ſometimes by the acre, and ſometimes by the load, containing forty buſhels; for the former, if a good crop, I pay for taking up and topping ten ſhillings and ſix-pence per acre; for

the latter, from one ſhilling to one ſhilling and two-pence per load, taking particular care of the tops, which are equally valuable with the roots for cows, ſheep, and ſwine. After the carrots are taken up, I lay them in an out-houſe, and cover them well with ſtraw, to guard them againſt the froſt, though it is not unuſual for ſome farmers to let them continue in the ground until they are wanted, which is leſs expenſive; and the weather muſt be extremely ſevere to injure the crown of the root, which is more hardy than either a turnip or potatoe. There is only one objection to which this practice appears to be liable, viz. that of the ground being ſometimes rendered too hard by the froſt to admit of their being taken up; but this may eaſily be obviated, by a little care and attention in the grower.

Reſpecting the weight of an acre of carrots, I confeſs my curioſity has not yet extended ſo far as to determine that point; but as to the quantity, I uſually grow from 200 to 500 buſhels per acre, which we ſell at ſix-pence per buſhel.

JOHN KIRBY.

Ipſwich, Feb. 4, 1785.

Article XII.

On Planting in the Rows of new and upland Incloſures.

[By Mr. John Wagstaff, Norwich.]

HAVING often ſeen and regretted the nakedneſs that appears in the hedge-rows of new and upland incloſures, I thought an expedient in planting might be hit upon to raiſe proſperous trees, that would at once decorate and improve ſuch incloſures. That which appeared moſt likely to prove advantageous was the *black*, or as it is ſometimes called, the *red* wood poplar [*populus nigra.*] This ſpecies will quickly grow to valuable timber; and when intermixed in the rows with the *populus alba*, [abele] makes a beautiful appearance. I obſerved in one particular ſituation a tree of the latter kind, which its proprietor (who knew not how it came there) called by the name of the *Dutch beech.* With the farmer's permiſſion, I lopp'd numerous cuttings or ſmall ſtands of the former, and many ſuch from the latter, which had been for ſome years propagated in my own plantations. The general length of theſe ſtands was from five to ſeven feet. I planted them in the following method, on the boundary of a piece of upland heath-ground, to be incloſed early in the ſpring, before the foliation of any leaves could take place.

Upon the interior edge of the intended ditch, holes were made about ten inches deep, and two feet from its brow; and their contents (the turf excepted) were thrown off. In theſe holes the cuttings were placed, and a ſpade full or two of earth, from different ſoils previouſly mixed for the purpoſe, filled up the holes, and fixed the cuttings firmly. Upon opening the ditch ſoon after planting them, I had the turfs piled round each about a foot above the level. After this the contents of the ditch were thrown up to form the bank, which left the ſtands in the middle of it. This was the whole proceſs reſpecting them. A layer of quick was then planted, and the bank guarded with thorns. Theſe cuttings generally ſucceeded, and have grown in height at leaſt two feet annually ſince planting, which was in the ſpring 1782, and now meaſure from ten to twelve feet from the ſlope of the bank, with their branches ſo enlarged and extended, as gives me reaſon to expect that in two more winters they will be equal in ſize and extent to thoſe cuttings from whence they proceeded. I have extended this mode of planting to ſeveral different ſpecies of willows, which have alſo ſucceeded, but not equal to the poplars.

I have reaſon to believe, that had theſe cuttings been larger and longer, they would have thriven propor-

proportionably; having about twelve years ſince planted truncheons of both theſe pieces of poplar (perhaps nine feet long, and about the circumference of a common hop-pole) on a gravelly bank of a ſtream, (but ſome yards from the current of water) which are now in girth from 24 to 28 inches, five feet from the ground; and in height equal to many oaks taken down for timber.

Aug. 31, 1785. J. WAGSTAFFE.

[N. B. It may probably be objected to the practice of raiſing large trees in hedge-rows, that the crops of grain receive injury from their roots and ſhade; but from trees of the poplar claſs, no hurt can ariſe; every thing thrives under their ſhade; and few ſpecies of wood are more profitable, as well from the quickneſs of its growth, as for its many uſeful and valuable properties. The timber is incomparable for turner's ware, bellows, and heels for women's ſhoes, and many uſes in the farm-yard and its appendages, light carts, &c. By EVELYN and MILLER it is recommended as a very excellent wood (eſpecially the abele kind) for floors, and wainſcoting rooms; being leſs ſubject to ſhrink or ſwell from the influence of a moiſt or dry air than moſt others.

Dr. HUNTER obſerves, (and we have ſeen the obſervation confirmed by experiments) that by the quick growth of theſe trees, and their value when cut, boggy or marſhy ground planted with them will produce more per acre than the beſt paſture or feeding land.]

Article XIII.

On various Articles of Eſſex Huſbandry.

[By the Rev. Mr. Onley, in a Letter to the Secretary.]

Sir,

I AM confident that in general, for any beneficial purpoſe, grazing is the farming of gentlemen. But where, as with us, hay ſells high, it is neceſſary, and probably in general more profitable, to have one-fourth of the land in four fields arable, for a ſupply of winter and ſpring artificial paſturage. The coach-horſes of any private family, without any material reſtraint, will conduct this buſineſs under one good *farming* ſervant; and the heavy expence of many labourers, and a team, which none but a mere farmer can manage to any œconomical purpoſe, and whoſe attention for a neceſſary return moſt continually be applied to matters of the *loweſt* kind, will be avoided.

In the diſpoſal of ground, (and even little men, avoiding the expenſive whims of taſte, may fairly attend to this, as it leads to that gardening neatneſs, on which *profitable* farming depends) a field or two of perfectly hoed crops form in the ramble a neceſſary contraſt to the grazing grounds, and with good low hedges, a few clumps of plantation,

tion, and, if without material expence it can be had, a little water, make together on any ſpot, without woods, lawns, lakes, or temples, an ornamented farm within the reach of every country gentleman, who may ſatisfy his honeſt pride, and not injure (nay, probably improve) his fair income.

That hoed crops will on moſt lands anſwer the purpoſe of fallows, is at leaſt moſt probable; but as this management cannot be effectual on heavy ones, but at a large expence, and the return from the chance of ſeaſons may not be greater on the whole than from fallowing after every third or fourth crop, which is a rough but ſure mode of preparing his land; no common farmer will venture the neceſſary expence, nor conſequently can by leaſe be entruſted with the privilege of conſtant cropping. With us three crops are allowed in ſucceſſion, provided beans, peaſe, turnips, each at leaſt twice well hoed, or clover, be one of the crops, and then fallow.

On this plan our farmers cultivate one hundred acres of ſtrong, moiſt, arable land, at the expence of four moderate horſes only;* plough with a pair

* Many of our correſpondents doubt whether four horſes can properly cultivate one hundred acres of moiſt arable land, as the time for working the fallows is often much ſhortened by the precarioufneſs of our climate.

a-breaſt

a-breaſt an acre a day, and riſe clover enough for ſummer; and, by two or three hoeings, turnips enough for winter, to maintain probably as many cattle, as in the beginning of this century were fed on their whole farms; many of which, I apprehend, were then little more than rough cow-paſtures. Our medium crops, about three quarters of wheat, four quarters of barley and oats, three quarters of beans and peaſe, per acre. Rent, rates, and tithe, about 1l. 1s. per acre.

We have no delicate inſtruments: a few have a double-breaſted plough to earth up betwixt the beans. Our hoeing is entirely by hand; the two hoeings of beans, peaſe, or turnips, nine ſhillings per acre, without beer. In general a third ſlight hoeing is eſſential, and pays well; as theſe ſtronger ſoils, thus pulverized, and richly dunged, and the turnips not left nearer than at a foot ſquare, grow them to a great bulk.

I once preſented to the late moſt worthy repreſentative of Colcheſter, Mr. GRAY, a ſpecimen of three turnips, that weighed twenty pounds each, from an acre where one with another every turnip was conjectured to weigh ſix pounds. Six ſtalled Scots were fattened from four acres. The only drawback is from the chance of ſeaſons, either in feeding

feeding on, or carting off the turnips from theſe ſoils; the injuring the produce of the ſucceeding crop, eſpecially barley, by not being able to form a fine ſowing tilth. The land therefore muſt be very early cleared; and conſequently a mode of drawing and preſerving turnips, would be of the greateſt benefit to us.

A tenant of my own, and my immediate neighbour, is, in ſoil, cropping, produce, and labour, an inſtance, not here in the leaſt ſingular, of what I have advanced; his four horſes, very far from ſtrong ones, (for with us there is an abſurd careleſsness in this point) cultivate thus one hundred arable ſtrong acres. As a pair more, *all* hazard, decay, and expence included, could not be kept under 20l. per annum; at the end of a twenty-one years' leaſe, ſuch a man, by keeping only the bare number ſufficient, and working them to the utmoſt, and avoiding the parade of a ſix-horſe team, will have ſaved 420l.

Pardon my adding,—that if the legiſlature had pleaſed, without any exemption, to have taxed every horſe above three years old, at five ſhillings, or even half of it, per annum, we had *all* been benefited: the ſtate, by a more profitable tax; the farmer, by being compelled to ſave ſo much more than his tax, in reducing his horſes to the proportion

tion of their fair work; and the publick, by the feed ſaved from a uſeleſs to a profitable beaſt.

That oxen on ſmall farms and incloſures would not anſwer for work, I believe; nor would the ſaving from the fattening them, afterwards, be ſo great as at firſt ſeems probable; but on large farms and heavy cartage, they muſt ſurely be very profitable, comparatively with an expenſive team of horſes; through the ſcandalous number of which, and the luxurious mode of uſing and ſupporting them, a very large portion of our beſt paſturage is thrown away; a crop of oats made as valuable as one of barley; and, be our export of wheat and malt again ever ſo productive, a melancholy deduction to be made on its neat produce, by the quantity of oats annually imported to anſwer our moſt prodigal conſumption.

That you may not imagine me to have an itch at haranguing upon evils, without forming ſome practical ſcheme to counteract them, I ſend you a courſe of twenty-one ſucceſſive crops, in which no two corn crops ſucceed each other, but are conſtantly ſeparated by either pulſe or herbage. In ſuch a ſucceſſion, the beans, peaſe, and turnips, muſt be very neatly three times hoed; the wheat once. The land richly dunged for turnips; the clover and tares *fed* off; and the plough turned into

into the land as ſoon as poſſible after each crop, in order to form a partial fallow for what is ſo quickly to ſucceed it.

A Courſe of Crops of Twenty-one Years, beginning and ending with a compleat Fallow, with the Produce, and its Value per Acre.

	Crops.	*Produce per quarter.*	*Value.*		
	Fallow		£.	*s.*	*d.*
1.	Barley	5 quarters at 1l. per qr.	5	0	0
2.	Clover	per acre	2	0	0
3.	Wheat	3 at 2l.	6	0	0
4.	Turnips	per acre	*2	0	0
5.	Oats	4 at 15s.	3	0	0
6.	Beans	3 at 1l.	3	0	0
7.	Barley	4 at 1l.	4	0	0
8.	Peaſe	3 at 1l.	3	0	0
9.	Wheat	3 at 2l.	6	0	0
10.	Winter-tares	per acre	2	0	0
11.	Barley	4 at 1l.	4	0	0
12.	Clover	per acre	2	0	0
13.	Wheat	3 at 2l.	6	0	0
14.	Turnips	per acre	2	0	0
15.	Oats	4 at 15s.	3	0	0
16.	Peaſe	3 at 1l.	3	0	0
17.	Wheat	3 at 2l.	6	0	0
18.	Winter-tares	per acre	2	0	0
19.	Barley	4 at 1l.	4	0	0
20.	Beans	3 at 1l.	3	0	0
21.	Wheat	3 at 2l.	6	0	0
	Fallow				
		In 23 years—Total	£.77	0	0

Or, within a ſhilling, 3l. 7s. per acre per annum.

The value of turnip crops in Eſſex is generally 3l. ſometimes more, per acre.

As I have brought the medium quantity and price of each crop to the ſame round ſum, it may not be thought exact; in the former, I conjecture, I have not exceeded; and believe, that in ſuch a courſe, on proper land, however the produce might annually vary, the total profit *on the whole* would at the end of the period be gained. The expence of ſuch a courſe of cultivation depends ſo much on local and temporary circumſtances, on the nature of ſoil, ſtate of ſeaſons, &c. that it is beſt left to every one's own calculation.

I begin with an additional quarter of barley per acre, as on our heavy lands a fallow is *ſuppoſed* neceſſary for that crop, and to pay by the increaſed produce. But *in general*, on friable land, I ſee no reaſon why the hoe and the plough, when effectually and quickly uſed, and where capital, ſpirit, and attention, are not wanting, and the *quantity* of land *not ſuperior* to theſe exertions, ſhould not *always beneficially* ſuperſede the neceſſity of a fallow; which, however excuſed, is too often only ignorance, obſtinacy, timidity, or parſimony diſguiſed; nor why a *long* leaſe, with a reſtraint on the *four laſt* years, might not permit a ſucceſſion of crops ſo cultivated. Under ſuch reſtrictions the produce of the tenant, however quick, would be the landlord's profit as well as his own.

On

On light lands, turnips, barley, clover, and wheat, [*the Norfolk courſe*] form a moſt profitable ſucceſſion; but in time even *theſe* lands ſeem ſurfeited, with the clover at leaſt; and trefoil, and ray-graſs, are obliged to be uſed to gain a ſwarth. With us wheat at every fourth, or certainly every fifth year, is thought a neceſſary profit.

In the preceding rotation, I have given, as the moſt productive, five crops of wheat, and four of barley, and two of every other; ſo that the variety, and chance of laſting benefit, ſeems as great as common farming will admit of.

Ignorant as I am in practical huſbandry, I venture theſe obſervations from a thorough conviction, that a moſt liberal encouragement of agriculture, and *unreſtrained* ſale of its produce, is ultimately the only ſure means of promoting manufactures, commerce, and population; and that if, inſtead of the policy inevitably fatal to a free and commercial ſtate, furniſhed with ſuch a variety of native products, of extending dominion, and forcing trade, ſimilar encouragement had been given towards colonizing and cultivating our waſte lands; every man would have kept at home, and ſuch inducements would have made him equally induſtrious there, in his produce and expenditure. This would have produced

produced double the return to the community, to that of any vagrant whom poverty or ſpeculation ever carried to gain bread or improve his fortune abroad.

I am, Sir,

Your very obedient ſervant,

Stiſted-Hall, Eſſex,
Aug. 14, 1784.

CHA. ONLEY.

Article XIV.

KENTISH AGRICULTURE, *(being Anſwers to the Society's printed Queries) tranſmitted by the Rev. Mr. Hill, of Eaſt-Malling, near Maidſtone, in Kent.*

GENTLEMEN,

IN reply to the Queries ſent to me by your Secretary, I ſend you the following Anſwers. Permit me to repeat my beſt wiſhes for the proſperity of your Society, and the ſucceſs of their very laudable endeavours to promote the advancement of Agriculture; and to aſſure you that I am, with great ſincerity,

Your moſt obedient ſervant,

DANIEL HILL.

Eaſt-Malling, July 16, 1785.

Query

Query 1ſt. What are the kinds of ſoil from which you generally obtain the beſt crops of wheat, barley, peaſe, oats, beans, vetches, turnips, carrots, and cabbages; and what are the uſual quanties of ſeed ſown, and the average produce per ſtatute acre, Wincheſter meaſure?

Anſwer. Our beſt crops are generally obtained from hazel loams; and if they are ſomewhat ſtiff and inclining to clay, the better. On ſuch lands, the uſe of heavy large harrows and rollers in the ſpring, to break and pulverize the ſoil, cannot be too much recommended. When the lands are ſo pulverized, we frequently get of wheat from four to five quarters, beans from five to ſeven quarters, barley and oats ſix and often ſeven quarters per acre.

The quantity of ſeed generally ſown per acre, is, of beans, peaſe, wheat,* and barley, three buſhels; of oats, from four to five buſhels.

Q. 2*d.* What is the uſual courſe of crops adopted by your beſt farmers on the different ſoils?

A. Our beſt lands never lie fallow; and the order of our crops is,

1. Wheat;
2. Barley, or Oats;

* Is it not ſurpriſing, that in a county where Agriculture is arrived to ſuch perfection, farmers ſhould ſow three buſhels of wheat per acre? Certainly two buſhels, even in the broadcaſt way, would be fully ſufficient.

3. Peaſe

3. Peaſe, or Beans;—the latter always in rows, hand-hoed twice with a two-inch hoe near and between the beans, horſe-hoed twice, and laſtly earthed with a horſe-hoe. After the beans are off, we plough ſhallow with a broad ſhare, and harrow up, and burn the weeds if any remain, thus preparing a good tilth for wheat.

On our ordinary, ſandy, or ſtone ſhattery [ſtone braſh] land, our courſe of crops is different.

1. Wheat.

After that, (before Michaelmas) ſow winter vetches or rye, and eat them off with ſheep and bullocks in the ſpring.

Then plough for turnips three or four times, each time harrowing off and burning the weeds; then lay on forty cart-loads of dung per acre. We always carefully hand-hoe the turnips, as the charge is amply repaid by the crop. Sometimes, in a kindly ſeaſon, we get a good crop of turnips after early peaſe.

Oats and barley will produce (eſpecially oats) from five to ſeven quarters per acre, after a good turnip ſeaſon, and the crop well fed off with ſheep, eſpecially if good hay and oil-cake be given them at the ſame time.

With barley and oats we ſow clover; next year wheat, and laſtly turnips.

Q. 3d. What manure now generally in uſe do you find moſt ſerviceable, on the following ſoils reſpectively, viz. ſtiff clays, light ſand, gravelly, moory, cold and wet, or what is called ſtone-braſh land?—In what quantities are the ſeveral manures laid on per acre; at what ſeaſon; and how long will each laſt without renewal?

A. On ſtiff clays or ſand, or gravelly cold wet land, lay marle or chalk early in the winter, at the rate of eighty cart-loads per acre, which will laſt twenty years; beſides this, dung and lime is ſometimes added.

Q. 4th. Have you diſcovered any NEW manure more efficacious than thoſe generally uſed, and which may eaſily be obtained in large quantities? If ſo, what is it, when and how applied?

A. Dung made by fat bullocks fed on hay and oil-cakes, and by ſheep fed on the ſame or turnip lands. Large oxen will eat twenty pounds of oil-cake per day, but Welch heifers will thrive well with half the quantity.

Q. 5th. What is the beſt top-dreſſing for cold wet paſtures which cannot eaſily be drained?

A. Wood-aſhes, coal-aſhes, with fowls or pigeons dung ſpread thin.

Q. 6th. What materials do you find beſt and moſt laſting for covered drains or land ditches?

A. Ragged ſtones or brickbats, or rather flat ſtones, two ſet on edge eight or ten inches aſunder, and a third over; and where theſe cannot be had, black-thorn or other buſhes. Some perſons uſe turf with the graſs ſide downwards, leaving a hollow below for the water.

Q. 7th. What are the kinds of wood which you have found from experience to thrive beſt on bleak barren ſoils, cold ſwampy bogs, and black ſhoory ground?

A. Scotch firs on bleak barren ſoils, eſpecially in a northern aſpect. On cold ſwampy bogs, the Dutch willow will do great things; but aſh will ſucceed better, and is far more uſeful and profitable.

Q. 8th. What are your methods of raiſing lucern, ſainfoin, and burnet; on what lands do you find them to anſwer beſt; and what is the average produce?

A. Lucern ſucceeds beſt in drills one foot aſunder,* and kept clean by a ſmall plough drawn by

* We apprehend a diſtance of at leaſt eighteen inches would be better, and occaſion leſs damage to the plants by the horſe going between the rows. From various experiments made to aſcertain the beſt diſtance between the rows of lucern, the fineſt and heavieſt crops have been from rows two feet apart.

one

one horſe. Sainfoin flouriſhes moſt on chalky, and dry ſtone ſhattery land, on which it will produce two tons per acre on an average, for fourteen or fifteen years. Burnet is in diſgrace with us, and generally laid aſide as uſeleſs.

Q. 9th. How is your turnip huſbandry conducted; and what is the beſt method of preventing or ſtopping the ravages of the fly on the young plants?

A. The firſt part of this query is anſwered in the ſecond. To prevent the ravages of the fly, ſome good is ſometimes done by running a light roller over them, with a bundle of blackthorn faſtened behind it.

Q. 10th. Do you prefer the drill to the broadcaſt method of ſowing grain; in what inſtances, and on what ſoils?

A. When lands are foul and weedy, the drill is certainly preferable to the broadcaſt; as by that means, the horſe-hoe may be uſed.

Q. 11th. What is the comparative advantage of uſing oxen inſtead of horſes in huſbandry?

A. Where a farm conſiſts of arable land and good paſture, the uſe of oxen is deemed preferable

to that of horſes, where men can be procured to drive them.

Q. 12*th.* Omitted.

Q. 13*th.* What new improvements have you made, or adopted, in implements of huſbandry?

A. Our improvements in implements of huſbandry have of late years been great and various, particularly in drill ploughs, which, by dropping the ſeed regularly, and depoſiting it at a proper depth, ſave a great deal of grain. Of carts we have a great variety, ſome for dung made ſtrong with two wheels for two horſes, and three wheels for one horſe; and others of lighter kinds.

I ſubmitted your queries to a very ſkilful Farmer, from whom I received the following anſwers for land of a *middling kind:*——

To the firſt Query.—We have moſt wheat, beans, and vetches, if in proper tilth, from ſtiff land. The moſt barley, peaſe, and oats, from a lighter ſoil. Wheat on an average twenty-eight buſhels per acre. We ſow three buſhels.

One ſack of barley ſown per acre produces five quarters after turnips. Five buſhels of peaſe per acre produce from three to four quarters. Four buſhels

buſhels of beans, and five buſhels of oats per acre, produce from five to ſix quarters.

Vetches, &c. fed off, make a good wheat ſeaſon.

2*d Query.*—A clean fallow, and ſowed with clover; after clover, wheat or beans the enſuing ſpring on one earth. Turnips on four ploughings and dunged; hand-hoeing twice. Then barley and clover; next wheat.

3*d Query.*—Our beſt manure is dung from beaſts fatted with oil-cakes, and fit for all ſoils. We lay on ſixty cart-loads per acre, (each cart holding thirty buſhels of coal) which, for turnips or wheat, will laſt ſix years.

5*th Query.*—Wood aſhes are the beſt, and will kill ruſhes.

6*th Query.*—Green alder poles, ſuch as we uſe for hops, ſixteen or eighteen feet long, two at the bottom and one at top; or green black-thorn covered with heath, or looſe ſtones, will do.

7*th*, 8*th*, *and* 10*th Queries.*—The ſame anſwers as from Mr. HILL.

9*th Query.*—Four ploughings, ſixty cart-loads of dung, and hoe twice.

12*th Query.*—Kill your ſheep as ſoon as the rot appears.

Article XV.

An Account of the Culture and Produce of Six Acres of Potatoes, on Land of the Value of 20s. an Acre.

[By John Billingsley, eſq.]

IN the year 1781, this field was in graſs, an old turf that had not been ploughed for more than 20 years. Firſt year 1782, black oats on the lay.

EXPENCES.	£.	s.	d.
Ploughing the plit not wider than ſix inches, and not more than three deep, 10s. per acre —	3	0	0
Seed five buſhels per acre, and ſowing —	4	10	0
Harrowing with blunt ſhort-tined harrow, 2s. per acre	0	12	0
Replacing ſuch turf as may have been pulled up by the harrow — — — — —	0	3	0
Mowing, harveſting, and ſecuring, 6s. per acre	1	16	0
Getting in, threſhing, &c. and winnowing 1s. 6d. per quarter — — — —	2	5	0
Rent 6l. Tithe 12s. — — —	6	12	0
Sundry expences, ſuch as highways, &c. —	0	6	0
	19	4	0

PRODUCE.			
Thirty quarters of oats at 26s. per qr. —	39	0	0
N. B. Some ſold for 32s.			
Ten loads of ſtraw at 12s. — —	6	0	0
It may be remarked here, that the great profit ariſes principally from the uncommon prices of oats, which, though ſold this year for near 30s. uſually are ſold for 14s. or 15s. per quarter.			
	45	0	0
Expences	19	4	0
Profit	25	16	0

Second year, 1783, Potatoes.

EXPENCES.	£.	s.	d.
1782. Nov. 3. Ploughing the out-ſtubble, at 4s.	1	4	0
1783. March 7. Another ploughing at 4s.	1	4	0
— 25. Harrowing at 2s.	0	12	0
30 cart-loads of dung per acre, 3s. per load, halling included	27	0	0
April 27. Began planting, and finiſhed the 25th of May, in beds 8 feet wide, and the alley 2½ feet, placed the ſets at 1 foot diſtance on the fallow, then ſpread the dung on them, after which they were covered 3 or 4 inches with the earth from the alleys, at 26s. per acre	7	16	0
Seed from Dumfries in Scotland, (very high price) 5 ſacks to an acre, at 14s. per ſack	21	0	0
June 15. Hoeing at 6s.	1	16	0
Aug. 3. Hand-weeding at 4s.	1	4	0
Oct. 18. Digging up at 40s. per acre	12	0	0
Halling, pitting, thatching, &c.	4	0	0
Tithe	1	10	0
Rent	6	0	0
Sundries, &c.	0	6	0
	85	12	

PRODUCE. [*Sacks of 240lb. wt.*]			
Beſt 550 ſacks, ſay at 4s.	110	0	0
Middling 100, at 3s. 6d. per ſack	17	10	0
Small 50, at 2s. 6d.	6	5	0
	133	15	0
Expences	85	12	0
Profit	48	3	0

Which is upwards of 8l. profit per acre, and the land left in excellent order for wheat.

Article XVI.

On the Culture of Potatoes.

[By the Rev. H. J. Close, Trimley, Suffolk.]

Gentlemen, *Nov.* 1785.

THE following practical obſervations on the culture and uſe of Potatoes, will not, I hope, appear entirely unintereſting. They are the reſult of various experiments made for five years ſucceſſively on that valuable root, the growth of which cannot be too much encouraged.

When the potatoe crop has been the only object in view, I have adopted the following method with the greateſt ſucceſs.

The land being well pulverized by two or three good harrowings and ploughings, is then manured with fifteen or twenty cart-loads of dung per acre, before it receives its laſt earth. Then it is thrown on to what the Suffolk farmers call the *trench balk*, which is narrow and deep ridge work, about fifteen inches from the center of one ridge to the center of the other. Women and children drop the ſets in the bottom of every furrow fifteen inches apart; men follow, and cover them with large hoes, a foot in width, pulling the mould down ſo as to bury the

the ſets five inches deep; they muſt receive two or three hand-hoeings, and be kept free from weeds; always obſerving to draw the earth as much as poſſible to the ſtems of the young plants. I find, by repeated trials, the firſt or ſecond week in April the moſt advantageous time for planting.

In the end of September or the beginning of October, when the haulm becomes withered, they ſhould be ploughed up with a ſtrong double-breaſted plough. The workman muſt be cautioned to ſet his plough very deep, that he may ſtrike below all the potatoes, to avoid damaging the crop. The women who pick them up, if not carefully attended to, will leave many in the ground, which will prove detrimental to any ſucceeding corn, whether wheat or barley. To avoid which inconvenience, let the land be harrowed, and turn ſwine in to glean the few that may be left by their negligence.

By this method, the ſets will be fifteen ſquare inches from each other; it will take eighteen buſhels to plant an acre; and the produce, if on a good mixed loamy ſoil, will amount to three hundred buſhels.

If the potatoes are grown as a preparation for wheat, I prefer having the rows two feet two inches from

from each other, hand-hoeing only the ſpace from plant to plant in each row; then turning a ſmall furrow from the inſide of each row by a common light-plough; and afterwards, with a double-breaſted plough with one horſe, ſplit the ridge formed by the firſt ploughing thoroughly to clean the intervals. This work ſhould not be done too deep the firſt time, to avoid burying the tender plants; but the laſt earth ſhould be ploughed as deep as poſſible; and the cloſer the mould is thrown to the ſtems of the plants, the more advantageous it will prove. Thus fifteen buſhels will plant an acre, and the produce will be about three hundred buſhels; but the land, by the ſummer ploughings, will be prepared to receive ſeed-wheat immediately, and almoſt enſure a plentiful crop.

The potatoe ſets ſhould be cut a week before planting, with one or two eyes to each, and the pieces not very ſmall; two buſhels of freſh-ſlaked lime ſhould be ſown over the ſurface of the land as ſoon as planted, which will effectually prevent the attacks of the grub.

The expence attending an acre of potatoes well cultivated in the firſt method, ſuppoſing the rent twenty ſhillings, tithe and town charges rather high, (as in Suffolk) taking up, and every thing included,

included, will be about ſix pounds. In the laſt method, it would be ſomewhat reduced.

I have many years ſold the greateſt part of my crops for ſeven ſhillings per ſack of three buſhels; thus the one hundred and twenty ſacks would amount to forty-two pounds; but they are now ſo much cultivated, that to make a fair, and what may be termed a ſure eſtimate, they ſhould be valued only as applicable to the feeding and fattening of cattle. I am convinced from experience, that they are worth three ſhillings per ſack for thoſe purpoſes, and then the produce would amount to eighteen pounds per acre. They are excellent food for hogs; roaſting pork is never ſo moiſt and delicate as when fed with potatoes, and killed from the barn-doors without any confinement. For bacon and hams, two buſhels of pea-meal ſhould be well incorporated with four buſhels of boiled potatoes, which quantity will fat a hog of twelve ſtone, (fourteen pounds to the ſtone.) Cows are particularly fond of them: half a buſhel at night, and the ſame proportion in the morning, with a ſmall quantity of hay, is ſufficient to keep three cows in full milk; they will yield as much and as ſweet butter as the beſt graſs.

In fattening cattle, I allow them all they will eat: beaſt of about thirty-five ſtone will require a buſhel

buſhel per day, but will fatten one-third ſooner than on turnips. The potatoes ſhould be clean waſhed, and not given until they are dry. They do not require boiling for any purpoſe but fattening hogs for bacon, or poultry; the latter eat them greedily. I prefer the champion potatoe to any ſort I ever cultivated. They do not anſwer ſo well for horſes and colts as I expected; (at leaſt they have not with me) though ſome other gentlemen have approved of them as ſubſtitutes for oats.

When predilections for old cuſtoms are ſubdued, I hope to ſee the potatoe admitted in the conſtant courſe of crops, by every ſpirited huſbandman. The moſt beneficial effects will, I am certain, accrue from ſuch a ſyſtem. The advantages in my neighbourhood are apparent; I cultivated, and fed my own children upon them, and my poorer neighbours ſenſibly followed the example. A great proportion of every cottager's garden is now occupied by this root, and it forms a principal part of their diet. Potatoes are cheap and excellent ſubſtitutes for peaſe in ſoups and broths, allowing double the quantity.

Although it is nearly a tranſcript of the directions given by a very ingenious author,* yet I ſhall

* Mr. HANWAY.

take

take the liberty of inſerting a receipt for making a potatoe ſoup, which I have weekly diſtributed amongſt the poor to their great relief.

	s.	d.
An ox's head — — —	2	6
Two pecks of potatoes — —	0	6
Quarter of a peck of onions —	0	3
Three quarters of a pound of ſalt —	0	1
An ounce and half of pepper —	0	3
Total	3	10

Ninety pints of water to be boiled with the above ingredients on a ſlow fire, until reduced to ſixty, will require one peck of coals, value three-pence. I have added the expence of every article according to their prices with me, that gentlemen may nearly perceive at how eaſy a rate they can feed ſixty of their poor neighbours. I find from experience, a pint of this ſoup, with a ſmall piece of the meat, is ſufficient to ſatisfy a hearty working man with a good meal. If vegetables are plentiful, ſome of every ſort may be added, with a few ſweet herbs.

I hope my inſerting the above, will not be eſteemed improper; though ſomewhat deviating from the culture of potatoes, it may poſſibly be a means of rendering them more extenſively uſeful, which is the earneſt and ſincere wiſh of

Your friend and ſervant,

Trimley, near Ipſwich. H. J. CLOSE.

Article XVII.

On the Culture of Turnip-rooted Cabbage.

[By Sir Thomas Beevor, bart.]

Gentlemen,

I AM glad to find, by a letter from your Secretary, that the importance and value of turnip-rooted cabbages are at length become more generally known, and better aſcertained in the Weſtern Counties. I have long experienced the benefit of them for a late ſpring feed; and laſt year (which was ſo unfavourable to all the crops of the common turnips, by the mildew in autumn, and the ſevere froſt in the winter, whereby they became rotten ſoon after Chriſtmas) has opened the eyes of my neighbours to ſee the propriety of a practice they had ſo long overlooked and neglected; I mean the having a portion of the turnip crop of this kind, as I have. The following is my method of cultivating them; and experience convinces me that it is cheaper and better than any other.

In the firſt or ſecond week in June, I ſow the ſame quantity of ſeed, hoe the plants at the ſame ſize, leave them at the ſame diſtance from each other, and treat them in all reſpects like the common turnip. In this method I have always obtained

tained a plentiful crop of them; to aſcertain the value of which, I need only inform you, that on the 23d day of April laſt, having then two acres left of my crop, ſound, and in great perfection, I divided them by fold hurdles into three parts of nearly equal dimenſions. Into the firſt part I put twenty-four ſmall bullocks of about thirty ſtone weight each (14lb. to the ſtone) and thirty middle-ſized fat wethers, which, at the end of the firſt week, after they had eaten down the greater part of the leaves, and ſome part of the roots, I ſhifted into the ſecond diviſion, and then put ſeventy lean ſheep into what was left of the firſt; theſe fed off the remainder of the turnips left by the fat ſtock; and ſo they were ſhifted through the three diviſions, the lean ſtock following the fat as they wanted food, until the whole was conſumed.

The twenty-four bullocks, and thirty fat wethers, continued in the turnips until the 21ſt of May, being exactly four weeks; and the ſeventy lean ſheep until the 29th, which is one day over four weeks: ſo that the two acres kept me twenty-four ſmall bullocks, and one hundred and ten ſheep, four weeks, not reckoning the overplus day of keeping the lean ſheep: The value, at the rate of keeping at that ſeaſon, cannot be eſtimated in any common year at leſs than four-pence a week for each

each ſheep, and one ſhilling and ſix-pence per week for each bullock, which would amount together to the ſum of 14*l.* 10*s.* 8*d.* for the two acres.

You will hardly, I conceive, think I have ſet the price of keeping the ſtock at too high a rate; it is beneath the price here in almoſt every ſpring, and in this laſt, it would have coſt double, could it have been procured; which was ſo far from being the caſe, that hundreds of ſheep and lambs here were loſt, and the reſt greatly pinched for want of food.

You will obſerve, gentlemen, that in the valuation of the crop above-mentioned, I have claimed no allowance for the great benefit the farmer receives by being enabled to ſuffer his graſs to get into a forward growth, nor for the ſuperior quality of theſe turnips in fattening his ſtock; both which circumſtances muſt ſtamp a new and a great additional value upon them. But as their continuance on the land may ſeem to be injurious to the ſucceeding crop, and indeed will deprive the farmer totally of either oats or barley; ſo to ſupply that loſs, I have always ſown buck-wheat on the firſt earth upon the land from which the turnips were thus fed off; allowing one buſhel of ſeed per acre, for which I commonly receive from five to ſix quarters per acre in return. And that I may not throw that part of

my

my land out of the ſame courſe of tillage with the reſt, I ſow my clover or other graſs-ſeeds with the buck-wheat, in the ſame manner as with the oat or barley crops, and have always found as good a *layer* [ley] of it afterwards.

Thus you ſee, that in providing a moſt incomparable vegetable food for cattle, in that ſeaſon of the year in which the farmer is generally moſt diſtreſſed, and his cattle almoſt ſtarved, a conſiderable profit may likewiſe be obtained; much beyond what is uſually derived from his former practice, by the great produce and price of a crop raiſed at ſo eaſy an expence as that of buck-wheat, which, with us, ſells commonly at the ſame price as barley, oftentimes more, and but very rarely for leſs.

From repeated trials, I have the confidence to believe, no farmer will ever have cauſe to repent adopting the practice I have recommended. It will ever be found convenient and profitable, although perhaps in many inſtances not altogether to the degree above-mentioned.

The land on which I have uſually ſown turnip-rooted cabbages is a dry mixed ſoil, worth fifteen ſhillings per acre. I am, &c.

THOMAS BEEVOR.

Hethel-Hall, Sept. 11, 1784.

ARTICLE XVIII.

Culture, Expences, and Produce of Six Acres of Potatoes, being a fair Part of near Seventy Acres, raiſed by John Billingsley, eſq; for which the Society's Premium was granted him in the year 1784.

EXPENCES.	£.	s.	d.
PLOUGHING an oat-ſtubble, in Oct. 1783, at 4s. per acre — —	1	4	0
Croſs-ploughing in March 1784	1	4	0
Harrowing 2s. per acre ———	0	12	0
180 cart-loads of compoſt manure, 3l. per acre —	18	0	0
42 ſacks of ſeed potatoes (each ſack weighing 240lb.) of the white ſort ——— — ——	10	10	0
Cutting the ſets, 6d. per ſack ——— —	1	1	0
Setting on ridges eight feet wide (leaving an interval of two feet for an alley) 6d. for every 20 yards	10	12	0
Hoeing at 5s. per acre — — ——	1	10	0
Digging up the two-feet interval, and throwing the earth on the plants, at 10s. per acre —	3	0	0
Digging up the crop at 8d. for every 20 yards in length, the breadth being eight feet — — —	14	6	0
Labour and expence of ſecuring in pits, wear and tear of baſkets, ſtraw, reed, ſpikes, &c. 10s. per acre	3	0	0
Rent 6l. Tithe 30s. ——— — —	7	10	0
	72	9	0

PRODUCE.			
600 ſacks of beſt potatoes, at 4s. per ſack —	120	0	0
120 ſacks of middle-ſized, 3s. 6d. — ——	21	0	0
50 of ſmall, 2s. ——— ———	5	0	0
N. B. Each ſack 240lb.			
	146	0	0
Expences	72	9	0
Profit	£.73	11	0

[Some perſons may object to the above price as being too high; but I can aſſure them, that they are worth more as a food for hogs; beſide, I have ſold potatoes within the laſt two years at 12s. per ſack, but I never before knew them at ſo low a price as the preſent.

At 6s. per ſack, the profit would be more than 24l. per acre, and at 8s. per ſack, 36l.]

GENTLEMEN,

It may be proper to remark, that the field on which the above experiment was made, was an oat-ſtubble in the autumn of 1783. In October is was ploughed, and left in a rough ſtate during the winter. In April, it was croſs-ploughed and harrowed.

On the 8th of May I began planting, by marking out the field into beds or ridges eight feet wide, leaving a ſpace of two feet wide for an alley between every two ridges. The manure (a compoſt of ſtable dung, virgin earth, and ſcrapings of a turnpike-road) was then brought on the land, and depoſited in ſmall heaps on the center of each ridge, in the proportion of about thirty cart-loads to each acre. A trench was then opened with a ſpade, breadth-way of the ridge, about four inches deep; in this trench the potatoe ſets were placed, at the diſtance of nine inches from each other; the dung was then ſpread in a trench on the ſets, and a ſpace or plit of fourteen inches in breadth dug in upon them.

When the plants were above ſix inches high, they were carefully hoed, and ſoon after the two-feet intervals between the ridges were dug, and the contents thrown around the young plants. This refreſhment, added to the ample manuring previouſly beſtowed, produced ſuch a luxuriance and rapidity of growth, that no weed could ſhew its head. I need not add, that the land is now in a ſtate of the higheſt fertility, perfectly clean, and in moſt excellent preparation either for wheat or ſpring corn.

It may be alſo remarked, that in this mode of planting, a very ſmall ſpace of ground is left unoccupied, and the crop more abundant, than any I ever before experienced.

If this experiment be thought worthy of imitation, and the culture of this excellent root be thereby in any degree extended; it will afford great ſatisfaction to the Society's well-wiſher,

And moſt obedient ſervant,

Aſhwick-Grove, J. BILLINGSLEY.
November 5, 1784.

P. S. I did not think it neceſſary to ſend particulars of my whole potatoe crop, as it would be in a great meaſure a recapitulation of the foregoing.

ARTICLE

Article XIX.

Account of a Crop of Turnips raiſed on poor Clay Soil, between rows of Beans, hand-hoed and horſe-hoed. With obſervations an Drilling and Horſe-hoeing Turnips.

[By R. P. Anderdon, eſq; in a letter to the Secretary.]

Sir, *Henlade, Feb.* 11, 1784.

THE inſpectors having viewed my experimental crop of turnips ſown in drills, I now take the opportunity of replying to your queries, and adding a few obſervations.

The piece of land which this crop grew upon, contains five acres and four perches.

The ſoil is a poor cold wet clay, with a fall towards the north; value only ten ſhillings per acre. This was certainly unfavourable to a turnip crop, except by way of experiment, to ſee what ſuch land would produce in the mode I propoſed to cultivate them.

In the year 1782, this field was drilled with turnips, in rows three feet aſunder; the ſeaſon being uncommonly wet, the crop was a very poor one; but the alleys between the rows being horſe-hoed, the Lent crop was put in on one earth.

In January 1783, fourteen cart-loads of dung and earth were carried to, and ſpread upon two parts of the field, which ſeemed poorer than the reſt.

In March, it was ploughed once, and ſown with double rows of beans about a foot aſunder, with alleys more than three feet wide between the double rows.

In May, the alleys were horſe-hoed; and in the beginning of June, rolled with a ſmall ſpiky roller; then horſe-hoed again, harrowed, and ſown with turnips the latter end of that month. The crop came up well, but was deſtroyed by the worm before the plants were in the rough leaf. The ſame alleys, without any further horſe-hoeing or ploughing, were drilled a ſecond time with turnips on the 16th of July, and produced the crop ſhewed to the Inſpectors. This crop was hand-hoed the firſt time about the middle of Auguſt, and a ſecond time about a month after, when the plants were thinned out as near as poſſible to nine inches aſunder, and the alleys moved by going *about* [i. e. up and down] in each of them, with the ſhim, or Kentiſh horſe-hoe, which promoted the growth of the crop moſt amazingly. The turnips were of the Norfolk round white kind, having a few of the red mixed with them. The horſe-hoeing was done with one horſe, at the ſmall expence of ſix ſhillings

the

the whole field, not fifteen-pence per acre. The hand-hoeings coſt the firſt time 9s. 4½d.; the ſecond time, 6s. 6½d. or leſs than 3s. 5d. per acre. The produce of a ſquare perch, fairly taken, weighed two cwt. 6lb. which is about ſixteen tons and a half per acre.

I ſhall now obſerve, that the expence of my horſe-hoeing, and two hand-hoeings together, have not exceeded what the hand-hoeing alone would have amounted to, had the turnips been ſown in the common broadcaſt method over the whole field;—that the land is in excellent order for a Lent crop on one earth;—and that I believe my crop is much greater than it would have been if ſown broadcaſt, and hoed by hand only, though in the moſt perfect manner. In *that* way, I doubt whether this field, in its preſent poor ſtate, would have produced a profitable crop.*

In this mode of ſowing, two ounces of ſeed (if good) would be an ample allowance per acre, if the crop eſcaped its enemies the *worm* and the *fly*; but if *they* invade it, two pounds may be inſufficient. I ſowed upwards of fifteen ounces per acre laſt year each ſowing; of the firſt, ſcarcely a plant ſurvived; and of the laſt, ſcarcely one plant in ten was per-

* Lands of inferior value produce from 30 to 35 tons per acre, only hand-hoed; but it ſhould be obſerved, that the ſoil is lighter and ſandy.

mitted

mitted to remain by the hand-hoers. And as the ſupernumerary plants are eaſily pulled out or cut up in hoeing, it is beſt to drill ſeed enough to allow for devaſtation.

Permit me here to enumerate many ſtriking advantages ariſing from this mode of cultivation in general, and the horſe-hoeing part of the proceſs in particular.

Firſt. That you may have a crop of beans and of turnips on the ſame land the ſame year.*

2*dly.* The Bean crop being well horſe-hoed, no ploughing is wanted for turnips, for which the beſt Norfolk farmers give five ploughings.†

3*dly.* It is hoed cheaper, more effectually, and conſequently more profitably, than in any other way.

4*thly.* The ground is kept clean from weeds.

5*thly.* It is in order for a Lent crop the ſucceeding year, with one earth.

6*thly.* The ground is kept in heart, if not improved, by fallowing your alleys.

7*thly.* It brings the plant to perfection in poor ground, where it would not become ſo otherwiſe.

* To this there is one principal objection, viz. that the ſame ſoil cannot be proper for both crops. Scotch cabbages are better adapted to a bean ſoil.

† Of late years, rarely more than three, unleſs the land be full of couch graſs.

8*thly.* It

8*thly*. It doubles the crop on any ground,* which I have had experience of.

9*thly*. You have (under Providence) the crops more within your own power in *this*, than in any other method, let the ſeaſons turn out as they will.

10*thly*. You may have, on the ſame ground, a bean and a turnip crop annually, if the land be ſuitable, and you think proper.

11*thly*. The clay farmer by this mode renders land, which is naturally unfit for turnips, ſo free and open, by ſeaſonable horſe-hoeings, that it will bring that uſeful plant to great perfection.†

Many of theſe advantages are peculiar to this mode of cultivation, excluſive of, and ſuperadded to, thoſe that attend the turnip crop itſelf.

But ſetting theſe ſuperior and extraordinary advantages aſide for the preſent, may it not be worth the attention of the Bath Society, to conſider how far it may be eligible to offer a premium for the beſt comparative trial between an acre ſown broadcaſt with turnip ſeed, and twice hand-hoed; and

* This we cannot help doubting very much, and think Mr. A. too ſanguine in his expectations.

† Nothing renders a clay ſoil ſo free and open, as to have it expoſed to froſts and ſnow, by being laid up in high ridges in January and February; which, on Mr. A's plan, cannot be done; unleſs the turnips are leſſened in value, by being fed off in autumn.

another

another acre by its ſide, drilled three feet aſunder, the lands being twice hand-hoed, and thinned, and the alleys twice horſe-hoed; both acres of land being of equal goodneſs, and equally prepared.*

At a future day, it may merit their conſideration to encourage, by ſuitable premiums, the production of the beſt crops that can be got of both beans and turnips, on the ſame land the ſame year.

I ſhould have taken notice of the advantages attending a full crop of drilled turnips, ſown about Midſummer; which is, that they will be in the ground time enough for two horſe-hoeings while in the moſt growing ſtate, which will much enlarge the crop for autumn feeding; for to any one, not acquainted with the effects of horſe-hoeing, it will be aſtoniſhing.†

It will not be amiſs to obſerve, that although nine inches was a proper diſtance in my poor land,

* We could have no objection to ſuch a trial; although we have not the leaſt doubt but the weight per acre would be nearly double on the broadcaſt part, while the other would be increaſed in expence by the two horſe-hoeings. It would, in fact, be fallowing *half* the land; which *turnips*, as a *meliorating* crop, by no means render neceſſary. They are intended to ſet aſide *all winter fallows*, and on land ſuitable for them they *do it effectually*.

† We perfectly agree in our opinion with Mr. A. of the advantages o horſe-hoeing heavy ſoils; but ſuch ſoils ſhould never be ſown with turnips, whoſe tap-roots (by which they are principally nouriſhed) are far below the operation of the hoe in a proper ſoil, and cannot penetrate a clay. This is proved by the ſmalineſs of Mr. A's crop.

yet

yet in a better ſoil, or in the ſame when better cultivated and manured, a foot or fourteen inches in the rows would be preferable.

I deſire it may be underſtood, that I do not claim to myſelf any merit as an *introducer* of drilling in rows, and horſe-hoeing turnips; or of drilling them between a crop of beans. I have only happily *adopted* thoſe modes of practice. The *firſt* was begun by TULL;* has anſwered well in Ireland; and I am happy to find, by the *ſecond volume* of your Select Papers, page 368, is already followed by the beſt farmers in Norfolk.† The *latter* has been ſucceſsfully uſed for many years, by an honeſt and induſtrious farmer (Mr. JOHN WILLY) of South-Petherton in this county; and I cannot too earneſtly recommend both. For certain I am, that whoever ſhall carefully attend to them, in a favourable ſeaſon, will never alter their practice, where prejudice does not prevail.‡

* Although this country is under great obligations to Mr. TULL, whoſe memory we honour, yet it is well known he carried his ſcheme of *horſe-hoeing* too far. It was his hobby-horſe, and he rode it without the curb of reaſon.

† Our Secretary being laſt ſummer in Norfolk, made particular enquiry reſpecting this, and finds the practice is now totally diſcontinued; and this, as the Rev. Mr. CLOSE informs us, is the caſe in Suffolk alſo.

‡ We cannot help wiſhing our very ingenious and valuable correſpondent Mr. A. a little leſs ſanguine in reſpect to the advantages of *horſe-hoeing* turnips. His crop totally contradicts his theory. Turnips will not, by any mode of culture, ſucceed well on a poor clay ſoil. Such lands may be far more advantageouſly cropped with articles where the horſe-hoe will be of much

It gives me pleaſure to find by your letter, that hand-hoeing turnips increaſes in this county and in Wilts. I conſider *that* as our greateſt improvement of late in Agriculture: but to drill them in rows, then to *hand-hoe* and thin them, and afterwards to horſe-hoe the intermediate ſpaces, I look upon to be the perfection of the turnip huſbandry.

The horſe-hoe, by pulverizing the ſoil, gives an inexhauſtible plenty of paſture to the plants, when the alleys are left ſufficiently wide, and the ground is in good heart. I allude to clays, loams, and ſtone-ruſh, with which only I have been concerned.

Wiſhing the Society may perfect the good work they have begun, I remain, Sir, &c.

R. PROCTER ANDERDON.

N. B. The obſervations on the preceding letter made by the Committee, having been ſent to Mr. *Anderdon* previous to their being printed, he obligingly returned the following anſwer:—

much greater ſervice:—And on good free turnip land, it is certainly improper, as much ground muſt be loſt to admit it. The horſe-hoe is adapted to plants that want earthing up, or that have lateral fibrous roots; which is not ſo much the caſe with turnips, as with cabbages. Turnips derive no other advantage from it than they would from hand-hoeing, which would ſufficiently deſtroy weeds, and admit of a far greater weight of turnips per acre.

SIR,

" SIR,

" YOU give me the opportunity to correct, or alter, what I had written to you, in reſpect to drilling and horſe-hoeing of turnips, and have ſent me the ſtrictures of your Committee thereon. I have reviſed the former, and read over the latter with attention, and thoroughly conſidered them both. The reſult is, I think, they may both continue as they are, with the addition of a few words* only to one article contained in my former letter, and of the following explanation, which I acknowledge to be requiſite, and, in my judgment, may be more ſatisfactory to thoſe who may take the trouble to read the whole, than any other mode or modification; and more reſpectful to the Committee, who have given their attention to comment on what I wrote.

" I am eaſily to be convinced, that in very light ſandy ground (on which I have had no experience) the horſe-hoe may be of little ſervice; but for ſuch kind of ſoils on which I have conſtantly for more than twenty years uſed the drill and horſe-hoe, which are both poor and rich clays, loam, and ſtone-ruſh, (alias ſtone-braſh) or a mixture, as in my caſe, of ſmall lime-ſtone and a clayey loam, it has produced a ſurpriſing effect, and my experience confirms my opinion on ſuch ſoils.

* Theſe are added in the Letter.

" I have

" I have aſſerted it will *double* the crop, and that aſſertion ought to be explained. I have made many comparative trials on turnips between this mode and broadcaſt ſowing, and always found, on *my ground*, the horſe-hoed crops the beſt. But here, in denoting the benefits of the horſe-hoe, by its *doubling* a crop, I wiſh to be underſtood, that if, *in ſoils like mine*, a crop be drilled, leaving proper intervals for horſe-hoeing, and one part be horſe-hoed, the other not, the horſe-hoed part will double the other in product.

" But, I imagine, the horſe-hoe will not ſuddenly be ſufficiently tried for the advantages of it to be generally known, unleſs (which is more to be wiſhed for, than expected) repeated comparative trials of horſe-hoed crops with other modes were to be made under the direction of government, or ſome publick inſtitution, on all kinds of ſoils, in every county in the kingdom.* By ſome ſuch meaſure alone, the exact point of diviſion between the heavy clay and the light ſand, where on one ſide the horſe-hoe would be beneficial, and on the other not, may be explored.

* We are as deſirous as Mr. A. can be to ſee this done; but the expence attending it would be too great for the finances of provincial ſocieties to defray. If government would allot a few hundred pounds to be ſolely appropriated by the different ſocieties to experiments of this kind, made in their ſeveral diſtricts, and under their immediate inſpection, the great queſtion " on what lands the drill and horſe-hoeing huſbandry is preferable " to the old broad-caſt?" might, in the courſe of four or five years, be deciſively and ſatisfactorily determined.

"Your Committee obſerve, that the ſame ſoil cannot be proper for beans and turnips. Doubtleſs a bean delights moſt in a heavy loam, a turnip in a light one. But, like taylors, we farmers muſt cut our coats according to our cloth. Were I to ſow no turnips but in a ſoil the beſt adapted to them, I could not get a plant, for I have no ſuch ſoil: but while I can get in ſingle rows, four feet aſunder, or more, from half a dozen to half a ſcore tons of turnips per acre, after, or rather between a crop of beans,* in my heavy lands, I ſhall feel *that product here* more beneficial than to drop the mode. I believe the medium of the two, ſo far as I can judge by the eye, or get information, to be ſuperior to the average produce of prepared fallow turnip crops in ten miles round me. As to the friendly wiſh of your Committee, that I would plant the Scotch cabbage between my beans, I am happy we agree ſo well in judgment: I have done ſo this year, in the ſame field where I have turnips alſo; but the crop of the latter is ſo preferable to that of the former, as to induce me to think the cabbage will not get to ſo great a perfection here, as to be profitably introduced on a large ſcale, for want of the profuſion of dung neceſſary for that crop, which we cannot procure.

* The queſtion here is, whether if inſtead of turnips Mr. A. planted his rows of beans two feet diſtant only, the extra produce of his crop would not have exceeded in value that of his turnips? We think they would; as theſe intervals would freely admit his horſe-hoe between the beans.

I muſt

I muſt now remark (with the greateſt deference to the judgment of the Committee) that the turnip *has* an abundance of very ſmall *lateral fibrous roots*, which run ſo far in ſearch of food, and feed as ravenouſly where they can penetrate, as thoſe of almoſt any other vegetable, and the plant certainly derives more nouriſhment from thoſe than from its tap-root.* Thoſe fine fibrous roots, almoſt imperceptible to the eye, iſſue chiefly from the apple or body of the turnip, and get into the richeſt part of the ſoil, near the ſurface, and will bring the plants to a conſiderable magnitude in heavy lands, adapted to beans, when mellowed by the horſe-hoe. I have this year had them ten and twelve pounds a piece, from the firſt ſowing, (the 16th of June) which is ſurely a profitable ſize: and could I raiſe only two turnips of ten pounds each on every ſquare-yard, it would yield a crop of forty-three tons an acre.

I muſt alſo inform you, that in the ſame field where my beans ſtood, I have now wheat very promiſing; and when my turnips and cabbages are off, I have no doubt, but by the aſſiſtance of my friendly horſe-hoes, I ſhall bring the wheat crop to as good maturity at harveſt, as any in the country.

* This is not the caſe with thoſe kinds of turnips which grow chiefly above ground, and which are generally the beſt crops, and moſt capable of reſiſting froſts.

After

After that I ſhall avail myſelf of the good tillage of my ground, and drill winter vetches, aſſuring myſelf (from my experience of this year in another field) of a good crop, if the next winter ſhould not be very unfavourable. The following ſummer [1787] if I live, *after a good dreſſing*, I intend to drill turnips all over the field, in rows three feet aſunder.* The next year [1788] to drill beans in the ſpring; turnips between them at Midſummer; and wheat where the beans ſtood at Michaelmas.

Do not therefore diſcourage me from riding what I perceive you are inclined to call my hobby-horſe. I promiſe you I will not ride him unreaſonably. He is a good thing, very tractable, goes very ſure, and has done his buſineſs well for more than twenty years paſt—now and then a ſmall trip, or falſe ſtep, may happen; but it is commonly the fault of the rider, not of the hobby-horſe, or horſe-hoe.

But to be more ſerious. Making laſt ſummer only two loads of hay from eleven acres of my beſt meadow, and making in the whole but a ſmall portion, I was from neceſſity obliged to turn my mind to a ſupply for the ſpring, which induced me to ſow turnips wherever I could; and in one field I drilled a ſingle row between my drilled wheat on

* Drilling them only two feet aſunder is, perhaps, preferable.

the 18th of July;—Auguſt the 20th and 22d, I drilled four rows of winter vetches in each interval between the turnips, at the rate of leſs than one peck and three quarters of ſeed to an acre. The turnip crop is very acceptable, and my vetches ſucceed beyond my warmeſt expectation, are thick enough, and give me the pleaſing proſpect and hope, that I ſhall not, when my dry meat is gone, want a ſeaſonable ſupply of early green fodder, that will laſt me till my lucerne comes on.

Now pleaſe to obſerve, that though I call in the aid of manure, (which our great maſter TULL did not) had it not been for the horſe-hoeing ſyſtem, I could not have had two good crops, one of turnips, the other of vetches, ſo ſpeedily after my wheat; nor either of them to be compared with thoſe I now have. Thoſe vetches, &c. I hope you, or ſome one of your ſociety, will ſoon ſee; for I rather wiſh my crops ſhould ſpeak for themſelves, than by me.

I totally agree with the Committee, that nothing renders a clay ſoil ſo free and open, as being laid in high ridges in January and February; in ſome degree every horſe-hoed field does ſo, and though not in ſo high a ridge, as in the caſe of a winter fallow, yet the middles of the alleys are lower than the ſides; and laſt ſpring I found my ground, after drilled

drilled beans and turnips, ſo mellow, that, notwithſtanding I intended to have given it three earths, I found it in as fine order with one as any ground I ever ſeeded with Lent corn; and my oat crop turned out for the ſeaſon accordingly. I am certain I make double the clear profit of my ploughed ground, that I ſhould do if I followed the common method of tillage, and courſe of crops, of this county.

It is not to be doubted, if the improvement of our waſte lands ſhould take place, but that the horſe-hoeing huſbandry, at the firſt outſet, will be preferable to any, were it only for the deſtruction of furze, fern, and other rubbiſh, which will for years be conſtantly ſtarting up again, while the crops are growing.

I will conclude with one obſervation, that having been taught to believe, it is a leading principle in agriculture to make wet ground dry, dry wet, heavy light, and light heavy; I am ſtrongly perſuaded, that when the light ſoils have been manured with marl, clay, lime, or other heavy ſubſtances, it will be difficult to find the land, or the turnip crop thereon, in drills three feet aſunder, that may not be admirably improved by the horſe-hoe, and brought to conſiderable perfection. And the ex-

periment on a ſmall ſcale will be neither troubleſome nor expenſive to any one who has, or can borrow, a drill-plough and horſe-hoe.

With great reſpect, I am,

Your obedient ſervant,

R. PROCTER ANDERDON.

Henlade, Feb. 9, 1786.

ARTICLE XX.

On the Culture of Beans with Turnips.

In a Letter to the SECRETARY.

SIR,

SINCE I had the pleaſure of viewing Mr. ANDERDON's turnips, and making a report thereof to you, I have frequently been conſidering, whether the method adopted by Mr. ANDERDON, or that generally practiſed in Norfolk and other counties, (viz. ſowing in broadcaſt, and twice hand-hoeing) might be ſuppoſed to be in general of the greateſt utility.

This, Sir, appears to me to be a queſtion of conſiderable importance; and though I am apprehenſive it cannot poſſibly be determined but by repeated accurate experiments, which may not for a long time

time be obtained, I have taken the liberty to trouble you with a few thoughts that have occurred to me on this ſubject, in hopes they may meet your approbation, and probably be the occaſion of ſome experiments for the deciſion of this queſtion.

I will take the liberty to ſuppoſe a crop of beans *drilled in ſingle rows* at four feet diſtance, and the turnips, like Mr. ANDERDON's, drilled in the intervals at a proper ſeaſon; in order to aſcertain the weight, there will then be four rows of ſeventeen feet in length to make a ſquare perch, whereas the length of Mr. ANDERDON's was only fifteen feet eight inches. This, Sir, will make a difference in the weight of a perch from 230 to 249 pounds; and in the weight of an acre from 16 tons 8cwt. 2qrs. 8lbs. to 17 tons 15cwt. 2qrs. 24lbs.

Each turnip at this diſtance (viz. four feet from row to row, and nine inches in the rows) muſt occupy a ſpace of three ſquare feet, conſequently the greateſt number produced in an acre muſt be 14520; but if ſown in broadcaſt, twice hoed, and the diſtance on an average 15 inches, each turnip will then occupy but little more than one foot and a half, and the number produced in an acre may be about 27920, which (allowing them to be of the ſame magnitude) will weigh about thirty-four tons

and four hundred weight. From hence there appears a manifeſt ſuperiority in favour of the broadcaſt and hand-hoeing; perhaps of more conſequence than the crop of beans (drilled as above) can reaſonably be expected to be worth.

Being almoſt an entire ſtranger to both theſe valuable modes of huſbandry, I can by no means pretend to aſcertain, with any tolerable degree of accuracy, the difference with reſpect to the expences: but am inclined to think, that the expence of drilling and horſe-hoeing the beans, together with drilling the turnips in the manner Mr. ANDERDON did, muſt be conſiderably leſs than that of fallowing and preparing the ground, and ſowing the turnips in broadcaſt; to which may be added another advantage; namely, the facility of hoeing the drills, in compariſon of the broadcaſt.

There is one conſideration more in favour of drilling between the beans, which I muſt confeſs has conſiderable weight with me, viz. the great chance, if not an almoſt certainty, of preſerving the turnips from the depredations of the fly; for as Mr. ANDERDON has had ſeveral ſuch crops without any damage of that kind, I ſuppoſe the beans to be almoſt a certain preventative.*

* This we doubt; and are inclined to think their eſcaping the fly proceeded from ſome other cauſe.

The

The principal point in determining this queſtion ſeems to me to be this: if the crop of beans drilled as above, after deducting the ſeed, and ſome additional expence in taking the crop off the ground without injuring the turnips, can be, one year with another, ſuppoſed to be as valuable as the quantity of turnips that might reaſonably be expected in the broadcaſt method more than in the other, I ſhould not heſitate to declare my humble opinion in favour of drilling between the beans.

A very few experiments, carefully made, would, I apprehend, be ſufficient to ſettle this point, and the value of a few ſuch crops of beans would be eaſily found; but from hence there ſeems to ariſe another queſtion, What are turnips worth per ton?

In anſwer to this, ſome of your ingenious correſpondents have informed us, that a ſheep of twenty pounds a quarter will eat twenty pounds of turnips in twenty-four hours. According to this calculation, a ton of turnips will keep one ſheep of that ſize 112 days, or ſixteen weeks, which at four-pence per week only is five ſhillings and four-pence; at which price I imagine they may be fairly valued, after deducting the reaſonable expence of drawing and carting them into another field, without doing which they are not nearly ſo valuable.

Though

Though I have no notion that the communication of theſe few thoughts to you will be productive of any good effects, unleſs they ſhould happen to be the means of occaſioning a few experiments, I was ſtrongly inclined to trouble you with them; you will therefore be kind enough to excuſe the freedom, and believe me to be,

SIR,

Your moſt obedient humble ſervant,

THOMAS PAVIER.

Weſt-Monkton, Feb. 23d, 1784.

[Mr. PAVIER's obſervations diſcover an attention which is ſeldom exerciſed in vain on agricultural ſubjects; but we wiſh him to conſider that Turnips are by no means well adapted to land ſuitable for beans. Cabbages would in general pay far better.]

ARTICLE XXI.

On making Butter and Cheeſe.

[By Mr. HAZARD, of Stoney-Littleton.]

GENTLEMEN,

AS no butter is eſteemed equal to that which is made in the county of Eſſex, and which is well known by the name of Epping butter, and which, in almoſt every ſeaſon of the year, will yield at

at London from one ſhilling to fourteen-pence per pound averdupoiſe, I preſume it will not be deemed improper to recommend farmers to adopt the method of making ſuch butter; I ſhall alſo add what I have gathered from upwards of twenty years experience, part of which time I reſided, and occupied a large farm, in the neighbourhood of Epping. I have ſince been a reſident in the county of Somerſet. And in both counties we could in general obtain one halfpenny or penny per pound more for our butter than the general market-price.

Before I proceed to point out the method of making the butter, it may not be improper to ſay ſomething concerning the Dairy-Houſe, which ſhould always be kept in the neateſt order, and ſo ſituated as that the windows or lattices never front the ſouth, ſouth-eaſt, or ſouth-weſt; lattices are alſo to be preferred to windows, as they admit a more free circulation of the air than *glazed* lights poſſibly can do. It has been objected, that they admit cold air in winter, and the ſun in ſummer; but the remedy is eaſily obviated, by making a frame the ſize or ſomewhat larger than the lattice, and conſtructing it ſo as to ſlide backward and forward at pleaſure; pack-thread ſtrained acroſs this frame, and oiled cap paper paſted thereon, will admit the light, and keep out the ſun and wind.

It is hardly poſſible in the ſummer to keep a dairy-houſe too cool; on which account none ſhould be ſituated far from a good ſpring or current of water. They ſhould be neatly paved either with red brick or ſmooth hard ſtone, and laid with a proper deſcent, ſo that no water may lodge; this pavement ſhould be well waſhed in the ſummer every day; and all the utenſils belonging to the dairy ſhould be kept perfectly clean; nor ſhould we ever ſuffer the churns to be ſcalded in the dairy, as the ſteam that ariſes from hot water will injure the milk. Nor do I approve of cheeſe being kept therein, or rennet for making cheeſe, or having a cheeſe-preſs fixed in a dairy, as the whey and curd will diffuſe their acidity throughout the room.

The proper receptacles for milk are earthen pans, or wooden vats or trundles, but none of theſe ſhould be lined with lead, as that mineral certainly contains a poiſonous quality, and may in ſome degree affect the milk; but if people are ſo obſtinate as to perſiſt in uſing them, I adviſe that they never forget to ſcald them, ſcrub them well with ſalt and water, and to dry them thoroughly, before they depoſit the milk therein. Indeed all the utenſils ſhould be cleaned in like manner before they are uſed; and if after this they in the leaſt degree ſmell ſour, they muſt undergo a ſecond ſcrubbing before they are fit for uſe.

With

With reſpect to making of butter, it is right to obſerve, that the greater the quantity made from a few cows, the greater will be the farmer's profit; therefore he ſhould never keep any but what are eſteemed good milkers. A bad cow will be equally expenſive in her keep, and will not perhaps (by the butter and cheeſe that are made from her) bring in more than from three to ſix pounds a year; whereas a good one will bring from ſeven to ten pounds per annum: therefore, it is obvious that bad cows ſhould be parted with, and good ones purchaſed in their room.

When ſuch are obtained, a good ſervant ſhould be employed to milk them; as by the neglect and miſmanagement of ſervants, it frequently happens that the beſt cows are ſpoiled. I adviſe no farmer to truſt entirely to ſervants, but ſometimes to ſee themſelves that their cows are milked clean; for if any milk be ſuffered to remain in the udder, the cow will daily give leſs, till at length ſhe will become dry before the proper time, and the next ſeaſon ſhe will ſcarce give milk ſufficient to pay for her keep.

It ſometimes happens that ſome of a cow's teats may be ſcratched or wounded ſo as to produce foul or corrupted milk; when this is the caſe, we ſhould by no means mix it with the ſweet milk, but give

it

it to the pigs; and that which is conveyed to the dairy-houſe ſhould remain in the pail till it is nearly cool, before it be ſtrained; I mean if the weather be warm; but in froſty weather it ſhould be immediately ſtrained, and a ſmall quantity of boiling water may be mixed with it, which will cauſe it to produce cream in abundance, and the more ſo, if the pans or vats have a large ſurface.

During the hot ſummer months, it is right to riſe with or before the ſun, that the cream may be ſkimm'd from the milk ere the dairy becomes warm; nor ſhould the milk at that ſeaſon ſtand longer in the vats, &c. than twenty-four hours, nor be ſkimm'd in the evening till after ſun-ſet. In winter milk may remain unſkimm'd for thirty-ſix or forty-eight hours; the cream ſhould be depoſited in a deep pan, which ſhould be kept during the ſummer in the cooleſt part of the dairy; or in a cool cellar where a free air is admitted, which is ſtill better. Where people have not an opportunity of churning every other day, they ſhould ſhift the cream daily into clean pans, which will keep it cool, but they ſhould never fail to churn at leaſt twice in the week in hot weather; and this work ſhould be done in a morning before the ſun appears; taking care to fix the churn where there is a free draught of air. If a pump-churn be to be

uſed,

uſed, it may be plunged a foot deep into a tub of cold water, and ſhould remain there during the whole time of churning, which will very much harden the butter. A ſtrong rancid flavour will be given to butter, if we churn ſo near the fire as to heat the wood in the winter ſeaſon.

After the butter is churned, it ſhould be immediately waſhed in many different waters, till it is perfectly cleanſed from the milk; but here I muſt remark, that a warm hand will ſoften it, and make it appear greaſy, ſo that it will be impoſſible to obtain the beſt price for it. The cheeſemongers uſe two pieces of wood for their butter; and if thoſe who have a very hot hand were to have ſuch, they might work the butter ſo as to make it more ſaleable.

The Epping butter is made up for market in long rolls, weighing a pound each; in the county of Somerſet they diſh it in half pounds for ſale; but if they forget to rub ſalt round the inſide of the diſh, it will be difficult to work it ſo as to make it appear handſome.

Butter will require, and endure, more working in winter than in ſummer; but I muſt remark, that I never knew any perſon whoſe hand was warm by nature make good butter.

Thoſe

Thoſe who uſe a pump-churn muſt endeavour to keep a regular ſtroke, nor ſhould they admit any perſon to aſſiſt them, except they keep nearly the ſame ſtroke; for if they churn more ſlowly, the butter will in the winter *go back*, as it is called; and if the ſtroke be more quick and violent in the ſummer, it will cauſe a fermentation, by which means the butter will imbibe a very diſagreeable flavour.

Where people keep many cows, a barrel-churn is to be preferred; but if this be not kept very clean, the bad effects will be diſcovered in the butter; nor muſt we forget to ſhift the ſituation of the churn when we uſe it, I mean as the ſeaſons alter, ſo as to fix it in a warm place in winter, and where there is a free air in ſummer.

In many parts of this kingdom they colour their butter in winter, but this adds nothing to its goodneſs; and it rarely happens that the farmers in or near Epping uſe any colour; but when they do, it is very innocent. They procure ſome ſound carrots, whoſe juice they expreſs through a ſieve, and mix with the cream when it enters the churn, which makes it appear like May butter; nor do they at any time uſe much ſalt, though a little is abſolutely neceſſary.

As

As they make in that county but very little cheeſe, ſo of courſe very little whey butter is made, nor do I wiſh any perſon to make it, except for preſent uſe, as it will not keep good more than two days; and the whey will turn to better account to fatten pigs with; nothing feeds them faſter, nor will any thing make them ſo delicately white. But I muſt obſerve, that no good bacon can be made from pigs thus fatted; where much butter is made, good cheeſe for ſervants may be obtained from ſkimm'd milk, and the whey will afterwards do for ſtore pigs.

The foregoing rules will ſuffice for making good butter in any county; but as ſome people are partial to the *Weſt-Country* method, I ſhall deſcribe it as briefly as poſſible.

In the firſt place they depoſit their milk in earthen pans in their dairy-houſe, and (after they have ſtood twelve hours in the ſummer, and double that ſpace in the winter) they remove them to ſtoves made for that purpoſe, which ſtoves are filled with hot embers; on theſe they remain till bubbles riſe, and the cream changes its colour; it is then deemed heated enough, and this they call ſcalded cream; it is afterwards removed ſteadily to the dairy, where it remains twelve hours more, and is then ſkimm'd from

from the milk, and put into a tub or churn; if it be put into a tub, it is beat well with the hand, and thus they obtain butter; but a cleanlier way is to make uſe of a churn. Some ſcald it over the fire, but then the ſmoke is apt to affect it; and in either caſe, if the pans touch the fire, they will crack or fly, and the milk and cream will be waſted.

The Cambridgeſhire ſalt butter is held in the higheſt eſteem, and is made nearly after the ſame method as the Epping; and by waſhing and working the ſalt from it, the cheeſemongers in London often ſell it at a high price for freſh butter. They depoſit it when made into wooden tubs or firkins, which they expoſe to the air for two or three weeks, waſhing them often; but a readier way is to ſeaſon them with unſlaked lime, or a large quantity of ſalt and water well boiled will do: with this they muſt be ſcrubbed ſeveral times, and afterwards thrown into cold water, where they ſhould remain three or four days, or till they are wanted; then they ſhould be ſcrubbed as before, and well rinſed with cold water; but before they receive the butter, care muſt be taken to rub every part of the inſide of the firkin with ſalt; then if the butter be properly made, and perfectly ſweet, it may be gently preſſed into the firkin; but it muſt be well ſalted when it is made up, and the ſalt ſhould be equally diſtributed through

through the whole maſs, and a good handful of ſalt muſt be ſpread on the top of the firkin, after which the head ſhould be immediately put on.

They purſue nearly the ſame method in Suffolk and Yorkſhire; nor is the butter that is made in thoſe counties much inferior to that made in Cambridgeſhire; indeed it is often ſold in London for Cambridge butter. No people make more butter from their cows than the Yorkſhire farmers do, which I am perſuaded is owing to the care they take of their cows in the winter; at that ſeaſon they houſe them all, feed them with good hay, and never ſuffer them to go out (except to water) but when the weather is very ſerene; and when their cows calve, they give them comfortable malt maſhes for two or three days after; but theſe cows never anſwer if they are removed to other counties, except the ſame care and attendance be given them, and then none anſwer better.

Land whereon cows feed very often affects the butter. If wild garlick, charlock, or May weed, be found in paſture grounds, cows ſhould not feed therein till after they have been mown, when ſuch pernicious plants will appear no more till the following ſpring; but thoſe cows that give milk muſt not partake of the hay made therefrom, as that will alſo diffuſe its bad qualities.

Great part of the Epping butter is made from cows that feed during the ſummer months in Epping foreſt, where the leaves and ſhrubby plants contribute greatly to the flavour of the butter. The mountains of Wales, the highlands of Scotland, and the moors, commons, and heaths in England, produce excellent butter where it is properly managed; and though not equal in quantity, yet far ſuperior in quality, to that which is produced from the richeſt meadows; and the land is often blamed when the butter is bad through miſmanagement, ſluttiſhneſs, or inattention.

Turnips and rape affect milk and butter, but brewers' grains are ſweet and wholſome food, and will make cows give abundance of milk; yet the cream thereon will be thin, except good hay be given at the ſame time, after every meal of grains.

Coleworts and cabbages are alſo excellent food: and if theſe and ſavoys were cultivated for this purpoſe, the farmers in general would find their account in it.

Cows ſhould never be ſuffered to drink improper water; ſtagnated pools, water wherein frogs, &c. ſpawn, common ſewers, and ponds that receive the drainings of ſtables, are improper.

I write

I write all theſe particulars from my own knowledge, and am well perſuaded they may prove uſeful to thoſe who are not too much bigotted to their own opinion.

CHEESE.

THE methods of making cheeſe are ſo various, that it is not in the power of any perſon to be acquainted with them all; however, I have ſelected a few of the beſt, or thoſe that are in the higheſt eſteem.

The Double Gloceſter is a cheeſe that pleaſes almoſt every palate; the beſt of this kind is made from new, or (as it is called in that and the adjoining counties) *covered milk*; an inferior ſort is made from what is called *half-covered milk*; though when any of theſe cheeſes turn out to be good, people are deceived, and often purchaſe them for the beſt *covered milk cheeſe*; but farmers who are honeſt have them ſtamped with a piece of wood made in the ſhape of a heart, ſo that any perſon may know them.

It will be every farmer's intereſt (if he has a ſufficient number of cows) to make a large cheeſe from one meal's milk; this, when brought in warm,

will be eaſily changed or turned with the rennet; but if the morning or night's milk be to be mixed with that which is freſh from the cow, it will be a longer time before it turns, nor will it change ſometimes without being heated over the fire, by which it often gets duſt, or ſoot; nor ſhould I forget ſmoak, which is ſure to give the cheeſe a very diſagreeable flavour.

When the milk is turned, the whey ſhould be carefully ſtrained from the curd, which curd ſhould be broken ſmall with the hands; and when it is equally broken, it muſt be put by little at a time into the vat, carefully breaking it as it is put in, which vat ſhould be filled an inch or more above the brim, that when the whey is preſſed out it may not ſhrink below the brim; if it does, the cheeſe will be worth very little. But firſt, before the curd is put in, a cheeſe-cloth, or ſtrainer, ſhould be laid at the bottom of the vat, and this ſhould be ſo large, that when the vat is filled with the curd, the ends of the cloth may turn again over the top of it; when this is done, it ſhould be taken to the preſs, and there remain for the ſpace of two hours, when it ſhould be turned, and have a clean cloth put under it, and turned over as before; it muſt then be preſſed again, and remain in the preſs ſix or eight hours, when it ſhould again be turned, and

rubbed

rubbed on each ſide with ſalt, after which it muſt be preſſed again for the ſpace of twelve or fourteen hours more; when, if any of the edges project, they ſhould be pared off; it may then be put on a dry board, where it ſhould be regularly turned every day.

It is a good way to have three or four holes bored round the lower part of the vat, that the whey may drain ſo perfectly from the cheeſe as that not the leaſt particle of it may remain.

The prevailing opinion of the people of Gloceſterſhire and the neighbouring counties is, that the cheeſes will ſpoil if they are not ſcraped and waſhed when they are found to be mouldy; but I know this to be erroneous, and that ſuffering the mould to remain, mellows them, provided they are turned every day; or if they will have the mould off, it ſhould be removed with a clean dry flannel, as the waſhing them is only a means of making the mould (which is a ſpecies of fungus rooted in the coat) grow again immediately.

Some people ſcald the curd, but this is a bad and mercenary practice; it robs the cheeſe of its fatneſs, and can only be done with a view to raiſe a greater quantity of whey butter, or to bring the cheeſes forward for ſale, by making them appear older than they really are.

As moſt people like to purchaſe high-coloured cheeſe, it may be right to mix a little *annatto* with the milk before it is turned; no cheeſe will look yellow without it; and though it does not in the leaſt add to the goodneſs, it is perfectly innocent in its nature and effects.

It is not in the power of any perſon to make good cheeſe with bad rennet; therefore the following receipt ſhould be attended to.

Firſt; That the *vell, maw, rennet-bag*, (or by whatever other name it is called) be perfectly ſweet, for if it be the leaſt tainted, the cheeſe will never be good. When this is fit for uſe, three pints or two quarts of ſoft water (clean and ſweet) ſhould be mixed with ſalt, wherein ſhould be put ſweet-briar, roſe leaves and flowers, cinnamon, mace, cloves, and, in ſhort, almoſt every ſort of ſpice and aromatic that can be procured, and if theſe are put into two quarts of water, they muſt boil gently till the liquor is reduced to three pints, and care ſhould be taken that this liquor is not ſmoaked; it ſhould be ſtrained clean from the ſpices, &c. and when found to be not warmer than milk from the cow, it ſhould be poured upon the vell or maw; a lemon may then be ſliced into it, when it may remain a day or two, after which it ſhould be ſtrained again and

put

put in a bottle, where, if well corked, it will keep good for twelve months or more; it will ſmell like a perfume, and a ſmall quantity of it will turn the milk, and give the cheeſe a pleaſing flavour; after this, if the *veil* be ſalted and dried for a week or two near the fire, it will do for the purpoſe again almoſt as well as beſor e.

Cheddar cheeſe is held in high eſteem; but I am well informed its goodneſs is chiefly owing to the land whereon the cows feed, as the method of making it is the ſame as is purſued throughout Somerſetſhire, and the adjoining counties; I mean not to exclude the north parts of Wiltſhire, where the land has a ſurpriſing effect on both butter and cheeſe.

Cheſhire cheeſe is much admired; and here I muſt obſerve, that no people take leſs pains with the rennet than the Cheſhire farmers; but their cheeſes are ſo large as often to exceed one hundred pounds weight each; to this (and the age they are kept, the richneſs of the land, and their keeping ſuch a number of cows, as to make ſuch a cheeſe without adding a ſecond meal's milk) their excellence may be attributed; indeed they ſalt the curd, (which may make a difference) and keep the cheeſes in a damp place after they are made, and are very careful to turn them daily.

But

But of all the cheeſe this kingdom produces, none is more highly eſteemed than the *Stilton*, which is called the Parmeſan of England, and (except faulty) is never ſold for leſs than one ſhilling or fourteen-pence per pound.

The *Stilton* cheeſes are uſually made in ſquare vats, and weigh from ſix to twelve pounds each cheeſe. Immediately after they are made, it is right to put them into ſquare boxes made exactly to fit them, they being ſo extremely rich, that except this precaution be taken they are apt to bulge out, and break aſunder: they ſhould be continually and daily turned in theſe boxes, and muſt be kept two years before they are properly mellowed for ſale.——Some make them in a net, ſomewhat like a cabbage net, ſo that they appear when made not unlike an acorn; but theſe are never ſo good as the other, having a thicker coat, and wanting all that rich flavour and mellowneſs which make them ſo pleaſing.

I muſt not omit to mention, that no people are more cleanly in their dairies thon thoſe of *Stilton* and its neighbourhood; and muſt alſo obſerve, that the making of theſe cheeſes is not confined to themſelves alone, as many others in Huntingdonſhire (not forgetting Rutland and Northampton-ſhires) make

make a ſimilar ſort, ſell them for the ſame price, and give all of them the name of Stilton cheeſes.

Though theſe farmers are remarked for cleanlineſs, they take very little pains with the *rennet*, as they in general only cut pieces from the *vell* or *maw*, which they put into the milk, and move gently about with the hand, by which means it breaks or turns it ſo, that they eaſily obtain the curd; but I am well aſſured, that if the method above deſcribed for making rennet were put in practice, they would make their cheeſe ſtill better; at leaſt they would not have ſo many faulty and unſound cheeſes; for notwithſtanding their cheeſes bear ſuch a name and price, they often find them ſo bad as not to be ſaleable; and I attribute this to their being ſo careleſs about the rennet.

I am perſuaded as good cheeſe might be made in other counties, if people would adhere to the *Stilton* plan, which is this—They make a cheeſe every morning, and to this meal of new milk they add the cream taken from that which is milked the night before; this, and the age of their cheeſes, I am almoſt confident, are the only reaſons why they are preferred to others; for, from the niceſt obſervation, I could never perceive that their land was in any reſpect ſuperior to that of other counties.

Excellent

Excellent cream cheeſes are made in Lincolnſhire, by adding the cream of one meal's milk to milk which comes immediately from the cow; theſe are preſſed gently two or three times, turned for a few days, and are then diſpoſed of at the rate of one ſhilling per pound, to be eaten while new with radiſhes, ſallad, &c.

Many people give ſkimm'd milk to pigs, but the whey will do equally as well after cheeſes are made from this milk; ſuch cheeſes will always ſell for at leaſt two-pence per pound, which will amount to a large ſum annually where they make much butter. The peaſants, and many of the farmers, in the north of England, never eat any better cheeſe; and though they appear harder, experience hath proved them to be much eaſier of digeſtion than any new milk cheeſes. A good market may always be found for the ſale of them at Briſtol.

As I have taken much pains, from actual practice, to find out the defects of others in making butter and cheeſe; ſo through my advice ſeveral have attained a perfection in this art; and I ſhall think myſelf unworthy your patronage, if all do not excel who will ſtrictly adhere to the methods laid down in the foregoing pages. I am,

Your obedient ſervant,

Stoney-Littleton, Somerſet, JOS. HAZARD.
Oct. 7, 1785.

Article XXII.

Of the Duration of the Wood of different Kinds of Trees, in their different Application, when expoſed to the Weather.

[By Sir Thomas Beevor, bart.]

Gentlemen, *Sept.* 11, 1784.

As the raiſing plantations of trees is not only an object of great national concern, but falls likewiſe within the compaſs of the Society's plan to encourage; and as the value and duration of the ſeveral kinds of them, in their different applications and uſes, is a ſubject of much utility as well as curioſity, I ſhall give you a ſhort account of an experiment made on ſome of them by a worthy friend of mine, a nobleman of this county, who is as much diſtinguiſhed by his thirſt after and poſſeſſion of claſſical and philoſophical knowledge, as he is honoured and beloved for his extenſive philanthropy.

Wiſhing to know the duration of ſome of the trees with which his noble plantations abound, he ordered, in the year 1774, three poſts, forming two ſides of a quadrangle, to be fixed in the earth upon a riſing ground in his park. Into theſe poſts were morticed the planks of the following trees, of which ſix faced ſouth and north, and ſix of them

eaſt

eaſt and weſt. In the firſt were put a plant of cedar, larch, ſpruce fir, ſilver fir, Scotch fir, and pineaſter. In the ſecond, a plank of Spaniſh cheſnut, abele, beech, walnut, ſycamore, and birch.

Theſe after being expoſed to the injuries of the weather from the year 1774 until laſt March, the time at which I viewed them, I then found in the following ſtate and condition:—

The Cedar was perfectly found.	Pineaſter, quite rotten.
Larch, the heart ſound, but the ſap quite decayed.	Cheſnut perfectly ſound.
Spruce fir, ſound.	Abele, ſound.
Silver fir, in decay.	Beech, ſound.
Scotch fir, much decayed.	Walnut, in decay.
	Sycamore much decayed.
	Birch, quite rotten.

Theſe planks were cut out an inch and a half thick, from trees of thirty years growth.

The above-mentioned appearances in ſome inſtances much diſappointed my expectation.—However, thus I found them; and as every experiment of this kind may be ſo eaſily conducted by any body, I hope it will be again and again made, upon an enlarged plan, with additional trees of different ages, abroad, and under cover; whereby the moſt profitable application of them may be fully aſcertained. I am, your obedient ſervant,

Hethel-Hall, Norfolk. THO. BEEVOR.

P. S. You will find by the date of my letter, that I have kept it ſome time ſince it was written. The delay, however, has enabled me to ſet right one fact contained in it. I was laſt week, at Houghton, and wiſhing to ſee that my relation was true in every particular, on queſtioning the ſteward, I found to my mortification that in ſome of the woods above-mentioned there was a difference of ten or fifteen years in the growth of the trees from which the planks were cut. Though for the ſake of truth I was glad to make this diſcovery, yet I am ſorry to find that it leſſens in ſome degree the value of the experiment.

[N. B. We hope the preceding letter from Sir THO. BEEVOR will excite other gentlemen to make ſimilar experiments, the event of which may prove of public utility.]

ARTICLE XXIII.

A Philoſophical Enquiry concerning the Principles of Vegetation, with a view to aſcertain the moſt certain means of promoting its Improvement and Extenſion.

[By Mr. JOSEPH WIMPEY, of North-Bockhampton.]

GENTLEMEN,

THE ſubject of this enquiry has been an object of purſuit in every age, and of every civilized country in the world; not uniformly, and uninterruptedly,

terruptedly, indeed, but in proportion to the peace and tranquility of reſpective ſtates and times. Rome, once the miſtreſs of the world, did not ſhine more in the arts of government and civil polity, than in the cultivation of her lands; and we find the ſame patriotic ſtateſmen, who rendered themſelves immortal by their unremitting efforts to ſupport and maintain liberty, were not leſs eminent for their patriotic ardour to promote and encourage the beneficial culture of its ſoil.

Inteſtine commotions and civil broils are ever unfriendly to ſcience and the arts, but to none more ſo than to agriculture; for when the occupier's tenure is rendered precarious by civil diſcord, he has little inclination and leſs encouragement to attempt improvement; and ſtill leſs to plough and ſow, it being uncertain who may reap, indeed whether there will be any thing to reap; it having too commonly happened, that whole countries have been ravaged and become deſolate by the deſperate frenzy of hoſtile and bloody contenders, who too frequently are deaf and blind to the remonſtrances of humanity.

It is certainly clear, from the average prices of corn and proviſions of all kinds for twenty years paſt, that there is not too much land in cultivation.

Prices

Prices have been conſiderably above what has been deemed, and that juſtly too, the medium ſtandard. As a manufacturing and commercial country, it is properly the duty of the legiſlature to provide, as far as conſiſtently may be with the liberty of the ſubject, that the price of proviſions may be kept as nearly as poſſible to their medium value. This is conceived to be very practicable, even ſo as to be a convenience to the grower as well as the conſumer.

Some writers of great abilities* have ſuppoſed, that the advance of commodities in price is rather apparent and nominal, than real. Things are not ſo much, if at all, advanced in price, ſay they, as is imagined; the precious metals are exceedingly increaſed in quantity, and proportionably fallen in value. Poſſibly there may be ſome truth in this obſervation, if we go back ſome hundred years, and if taken upon a ſcale that comprehends all Europe; but for the term of twenty or fifty, or even from the time Mr. Locke wrote to the preſent hour, there is little difference in the value of ſilver or gold; an ounce of either being of much the ſame value now as then. The frequent and ſudden changes that take place in the price of corn and other commodities, which ſometimes are at double the price one year they were the foregoing, muſt

* Mr. Locke, Baron Montesquieu, &c.

be

be owing to ſome other cauſe than that above-mentioned, which operates ſlowly, if at all, and is not perceivable in leſs time than a century.

If the quantity of corn and proviſions at market always bore the ſame proportion to the demand there is for them, the price would be always invariably and unchangeably the ſame. The variation of prices therefore is governed by the variation of the ſaid proportion. If the demand be greater, and the quantity the ſame, or the demand the ſame, and the quantity leſs, the price muſt neceſſarily advance; and *vice verſa*, if the quantity ſhould increaſe, and the demand continue the ſame, the price muſt as neceſſarily fall; and it is not in the power of man to make it otherwiſe. But though this immutable relation is beyond our power to alter, we can by art and induſtry increaſe the quantity, and thereby lower the price; cheapneſs being the infallible conſequence of plenty, which is the direct object and effect of an improving cultivation. This is a matter of great conſequence to the poor labourer, the manufacturer, and merchant; and no diſadvantage to the grower; becauſe what he would loſe by the fall of price, he would gain with intereſt by an increaſe of quantity.*

* This is not always the caſe. Of two profits *nominally equal*, that is to be preferred which is obtained with the *leaſt expence of labour*:—That which ariſes from an *increaſe of quantity*, is clogged with the *greateſt*, and much more care and trouble.

It is not eaſy to conceive how many and how great the improvements are, which have been made in this moſt important of all arts, in the courſe of the preſent century. A patriotic ſpirit of uncommon ardour hath gone forth; and our nobility and gentry, like the Senators of Rome, have ſet, as it were, their hands to the plough, and excited their tenants and neighbours to practices of which they had no idea before. Yea, they have done more; they have inſtituted ſocieties, and made them the receptacles and diſtributors of uſeful knowledge; they have raiſed ſubſcriptions, and added marks of honour, and pecuniary advantages, to the rewards which naturally reſult from the attention and induſtry of the ingenious artiſt. Surely the greateſt reſpect is due to the members of all thoſe inſtitutions, whoſe motives are—public good and univerſal uſefulneſs.

But it muſt be allowed, that, although much has been done, there ſtill remains much more to do. Experimenters have not always(perhaps but ſeldom) entered into the views, and ably ſeconded the intentions of thoſe valuable inſtitutions. Animated with the hope of obtaining the premiums held out, by dint of extraordinary exertions, expenſive manures, and a concurrence of fortunate circumſtances, more the effect of chance than of deſign, they often

have been the ſucceſsful adventurers, though at the ſame time entirely ignorant to what cauſes they owed their ſucceſs. We too often indeed aſcribe effects to cauſes which are no way connected with them. The practice of ſuch men is more like the noſtrums of quacks, than the recipes of a regular phyſician. The medicine may be good, but being ignorant of principles, they know not how to accommodate it as different circumſtances may require.

How vegetation may be carried to the greateſt degree of perfection, by means eaſily practicable, and at the ſame time the moſt advantageous to the huſbandman, is one of the moſt important enquiries that the human underſtanding can be employed in the purſuit of. Some ingenious men, however, have made the following the previous queſtion, " What is that ſubſtance, matter, or thing, which is the true and only proper food of plants; which enters into the veſſels appointed by nature to receive it, is aſſimilated by, and becomes conſtituent parts of them, augmenting their magnitude, extenſion, and weight, from an almoſt imperceptible atom to the weight of many tons, and to a body of inconceivable dimenſions?"

This queſtion ſeems much more curious than uſeful, and is perhaps of very little conſequence to the

the huſbandman. The philoſopher may amuſe himſelf by enquiring after firſt principles, and the elementary parts of bodies, but the farmer ſhould never be diverted from a profitable practice, until one more ſo is recommended by the ſucceſs of repeated experiments.

Various are the opinions of the learned concerning this matter. Some ſuppoſe the food of plants to be water; ſome earth; others air, nitrous ſalts, oil, &c. &c. perhaps all of them wide enough of the mark. It muſt be confeſſed, we know nothing of the eſſence of things. We are not endued with faculties equal to the curious reſearch. Things are known to us by their properties only. But what are their properties by which they are known to us, but certain powers to affect us in a particular manner, and to impreſs different ſenſations and perceptions on our bodily organs? Theſe different perceptions, indeed, enable us to diſtinguiſh, accurately enough, one thing from another; but we are totally ignorant of the nature of thoſe powers, and equally ſo of the eſſence or ſubſtratum in which they inhere, and by which they are ſupported.

The great ſyſtem of the univerſe is governed by general laws, which, ſo far as our knowledge extends, obtain univerſally. Gravitation, attraction, repulſion, coheſion, and perhaps many other prin-

ciples, affect every portion of matter that comes within our knowledge; but what ſupports thoſe powers, in what their energy conſiſts, or from whence they are derived, we are by no means able to apprehend or conceive. Vegetation alſo obtains univerſally on this globe. Wherever there is earth, vegetation takes place; therefore the principle (or principles) of vegetation, whatſoever it be, or in whatſoever it conſiſts, muſt be univerſal; and all that is neceſſary for the huſbandman to do, is to prepare his ground effectually, put in his ſeed or plants at the proper ſeaſon, and vegetation will moſt aſſuredly follow. Indeed, ſo prolifick is nature as to clothe the face of the globe with herbs and plants in every region, without the intervention or aſſiſtance of man. The fund or magazine, then, which furniſhes the pabulum or food of plants, is eſtabliſhed and ſupplied by the œconomy of nature, ſeeing it obtains at all times and every where, unaſſiſted by art. But how and in what manner nature is to be aſſiſted, how and by what means vegetation is to be promoted, and carried to its utmoſt and moſt beneficial degree of perfection, is the grand *deſideratum*, the great and important object, of our enquiry.

Experiments or obſervations made on occurrences which happen in the courſe of things, are the ground-work

ground-work of all certainty in this matter. Theories not built upon and ſupported by experiments are matters of mere amuſement, and have no exiſtence but in the imagination. Unfortunately, experiments have been publiſhed by the thouſand, which bear the cleareſt internal evidence of their never having been made but upon paper. Such writers ſhould be regarded as the ſharks of ſociety, who would ſacrifice truth, miſlead mankind, and impoſe upon the publick, to pocket a little money. But to proceed with our enquiry.

The principles of vegetation, and the means by which it may be promoted in the moſt ſucceſsful and beneficial manner, may be fitly divided into three general heads, and diſtinguiſhed by the terms *mechanical*, *chemical*, and *nutritive*. The *mechanical* includes every operation which tends to break, divide, and pulverize the ſoil; whether it be by ploughing and harrowing, digging and hoeing, or by any other means whatever; that being the moſt eligible which moſt effectually performs the operation at the leaſt expence.

Pulverizing the ſoil may be truly conſidered as the firſt ſtep towards an improving vegetation; not as *producing* the food or nouriſhment of plants, but of putting the ſoil into a fit condition for *receiving*

it, from whatever ſource it may be derived, and giving eaſy acceſs to the roots and fibres which extend themſelves every way in queſt of the ſame.

Chemical principles produce much the ſame effects, but in a way we cannot ſo eaſily, nor ſo perfectly, comprehend. The mechanical powers are ſubſervient to our wills, and we can continue the uſe of them until the deſired end is obtained; but the effects of chemical operations are not ſo certain in this buſineſs, as a certain concurrence of circumſtances, not always in our power to procure, is neceſſary to produce the hoped-for ſucceſs. Much depends upon the temperature of the ſeaſons, the ſtate of the air, and many other things not in the power of man to foreſee or to govern. Fermentation ſeems to be the principal agent in promoting vegetation by chemical powers. This divides, attenuates, and ſubtilizes, by means of an internal motion of the parts, which we cannot clearly conceive. Probably it is on this principle that marl, chalk, ſhells, and every kind of calcareous earth, are fertilizers of land. Not by any matter or ſubſtance inherent in them, as conſtituent parts of the ſame; but as abſorbent bodies, which attract much more powerfully the principles of vegetation than earth alone could do.

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We come next to enquire concerning nutritive principles. And here we have a field to range in as capacious at leaſt as the earth we inhabit, together with its atmoſphere; perhaps much more, even not leſs than the ſolar ſyſtem, as that immenſe body of fire, which is the centre thereof, gives life and energy to the whole creation; and annually revives, reanimates, and beſtows as it were rejuvineſcency on the whole animal and vegetable world.

But before we proceed on this enquiry, it may be proper to make a few obſervations, the truth of which is ſelf-evident, and conſonant to the common ſenſe of mankind. By common ſenſe, the writer does not mean common *opinion*; for nothing is more vague and liable to error than that; but thoſe ideas which are the ſame in all men, as proceeding from identical or ſimilar ſenſations and perceptions involuntarily impreſſed upom them. This is the true and only defenſible meaning of the term common ſenſe, though it is frequently made to ſtand for, and expreſs, principles which are ſuppoſed to be innate in the mind, but in fact have nothing common or identical in them, but are as infinitely diverſified in different men as are their features.

There ſeems to be a natural relation, connexion, and dependence, between the animal and vegeta-

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ble kingdoms. No part of the terraqueous globe that we know of, that is occupied by living creatures of any kind, but is replete with vegetables proper for their ſuſtenance and ſupport; and it is equally certain, that wherever vegetables grow and flouriſh, it is ſtocked with animals in proportion thereto.

It is ſufficiently obvious, that the animal kingdom is maintained and ſupported by the vegetable; for though carnivorous animals eat little or no vegetable food, yet they live upon thoſe which are entirely ſupported by it; for they never eat each other, unleſs in caſes of famine or great diſtreſs. It is very poſſible the vegetable kingdom may no leſs depend upon the animal for its ſuſtenance and ſupport, than the animal doth upon it; and if the writer is not much miſtaken, pretty clear and ſtrong evidence may be had, that this is really the caſe; ſo that they reciprocally ſubſiſt on and are ſupported by each other.

It is not many years ſince that a ſurpriſing diſcovery was made by that very celebrated inveſtigator of nature Dr. PRIESTLEY, who clearly proved by experiment, that common air, when become feculent and putrid by animal reſpiration and perſpiration, ſo as to be unfit for the common purpoſes

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of life, is readily purified and make wholſome by the vegetable kingdom, which imbibes and abſorbs thoſe putrid ſteams that are ſo deadly noxious to animal life. But what is moſt ſurpriſing, inſtead of growing ſickly in ſo impure an air as he expected, he found the plants were invigorated and their growth promoted thereby; ſo that they were more freſh, green, and healthy, than thoſe which grew in common wholſome reſpirable air.*

This wonderful œconomy of nature loudly proclaims the wiſdom and goodneſs of Providence; for how great ſoever might be the fund of common air neceſſary to the purpoſes of life, ſuch is its continual waſte and conſumption, that the whole ſtock muſt ſoon have been exhauſted, and animal life become extinct, if no proviſion had been made to purify and render wholſome the original ſtock, as daily uſe might require.

But not to inſiſt on a particular inſtance which may be thought too curious to eſtabliſh a general principle upon, let us enquire how far this doctrine may be ſupported by the concurring teſtimony of all mankind, in which there is not a poſſibility

* A very full and pleaſing account of this wonderful diſcovery may be found in a very elegant diſcourſe of Sir JOHN PRINGLE's, read before the Royal Society at one of their anniverſary meetings, which met with general approbation; and ſome marks of favour were beſtowed upon the Doctor, in reward of his ingenuity.

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of deception; for if thoſe facts which are agreeable to and ſupported by the common ſenſe of mankind cannot be depended upon for certain infallible truths, then there is no ſuch thing as certainty attainable by human nature. Is it poſſible to doubt, if that glorious luminary the ſun, which diſpenſes heat, and light, and life, to this lower world, hath any real exiſtence, and is the cauſe of thoſe ſenſations? Surely it is not; and yet in what does this certainty conſiſt, but the common ſenſe of mankind? I ſee, feel, perceive, and am affected in a particular manner by the appearance of this fountain of life; all mankind are impreſt with identical or ſimilar ſenſations, perceptions, and affections; therefore no man doubts, or can poſſibly doubt of, the certainty and reality of the ſun's exiſtence.

All truths which are derived from common ſenſe, are equally certain with the above; for if it were poſſible that all men could be deceived in any of thoſe ſenſations, perceptions, and affections, which are common to all men; that is, if they could ſee, feel, and be affected in any way or manner they could not ſee, feel, and be affected, then truth and certainty to the human mind would be an impoſſible thing; there being no criteria by which truth might be diſtinguiſhed from falſhood, nor man indued with faculties to perceive and mark the difference of things.

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Thoſe things then which are felt, perceived, and produce the ſame ſenſations and affections in all men, and every where, may be depended upon as truths infallibly certain, beyond a poſſibility of deception. Not ſo experiments made by the moſt careful and the moſt candid, till they have been repeated again and again; and the firſt trials confirmed and duly authenticated by ſubſequent ones. Much more is to be feared from the cunning, the artifice, the prepoſſeſſion, the prejudice, the vanity, and the intereſt, of deſigning men, who too frequently have been found to warp and bend their accounts, to promote their intereſted views.

It is in the obſervation of every man, from the illiterate occupier of a cottage to the firſt gardener of a prince, that all kinds of animal ſubſtances, when thoroughly digeſted and corrupted, are the ſtrongeſt and moſt powerful promoters of vegetation. The hair, the ſkin, the horns and hoofs, the urine and excrements, the fleſh, blood, ſinews, and even the bones, are all richly replete with matter which ſupports and invigorates vegetation univerſally. It is therefore undeniably certain, that animal ſubſtances contain thoſe principles which are the real and genuine food of plants. It is abſurd therefore to ſuppoſe their food is earth, or water, or air, fire, or heat, or any one ſimple element or thing

thing whatever. It ſeems clearly evident, that it is a combination of principles derived from animal ſubſtances by the chemiſtry of nature. When animal ſubſtance has been thoroughly putrified, almoſt the whole becomes volatile, and is ſo far attenuated, ſubtilized, and refined, as to be rendered capable of entering the roots and fibres of the minuteſt plants.

It ſeems then, that as the animal kingdom is entirely ſupported by the vegetable, ſo is the vegetable by the animal, and each is reciprocally the ſupport of, and is ſupported by the other. The matter of each is eſſentially the ſame, each is indued with the principles of life and augmentation, though appearing under very different forms; each mutually tranſmutable into the other by the mere unaſſiſted operations of nature.

Hence it ſeems to appear, that the wiſdom and goodneſs of Providence have eſtabliſhed the means of ſupporting and upholding the preſent ſyſtem of the univerſe, till time ſhall be no more, by conſtant, uniform, uninterrupted powers or laws, which act unceaſingly for the mutual conſervation of the whole. Every atom of matter, whether animal or vegetable, ſeems to teem with life, yet contains within itſelf the ſeeds of corruption and decay.

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In that ſtate it enters into a new ſyſtem of organization, and becomes the principle of regeneration and rejuveneſcence, which annually returns at the appointed ſeaſons, when all appears charming, ſprightly, and gay.

To this theory it may be objected, that vegetation may be ſucceſsfully promoted by vegetable manures, without the leaſt aſſiſtance from animal ſubſtance of any kind. Every one knows that it is common to manure the ground by ploughing in green vegetables, ſuch as buck or French wheat, clover, vetches, &c. which often ſucceed well without any other help whatever. This objection falls ſhort of its object; it only proves, that profitable crops may be obtained without the cultivator's uſing animal ſubſtances under that form; but the theory ſuppoſes, that every vegetable is replete with principles derived from animal ſubſtances, and only differs from them in being more ſubtilized and refined.

It is equally certain, that vegetation may be powerfully promoted, without laying on or providing any manure at all. The new or horſe-hoeing huſbandry depends entirely upon reducing and pulverizing the ſoil. It cannot be reaſonably ſuppoſed, however, that the ſpade and hoe, or plough and

and harrow, convey any fertilizing principles. Theſe operations, which are found to render our lands ſo ſurpriſingly fertile when judiciouſly performed, only prepare the ſoil for the eaſy entrance of thoſe fertilizing principles with which the atmoſphere is abundantly replete. The atmoſphere is the grand magazine, the great receptacle of putrid exhalations, which inceſſantly fly off from all animal ſubſtances, the living as well as dead; and by their ſpecifick levity mount up into the air, from whence, being condenſed, they return in dews, rain, ſnow, &c. and impregnate the ſoil as deep as it hath been duly pulverized.

It ſeems very evident then, that whether the huſbandman manure his fields from the dung-heap, or by ploughing in green vegetables, or by duly expoſing it to the unceaſing influence of the atmoſphere; the principles of vegetation, which he beſtows in either caſe, are eſſentially and ſubſtantially the ſame. They all equally originate from putrid animal ſubſtances. That from the dung-heap is indeed by far the ſtrongeſt, it having not gone through its laſt ſtage of digeſtion and putrefaction; in this groſs and impure ſtate, it ſometimes poiſons and kills, and thereby defeats its intended purpoſe. It in general, however, when diſcreetly uſed, gives great luxuriance and an enlarged

larged ſize to the ſtalks and blades; but luxuriance is not fruitfulneſs; indeed, they are ſeldom if ever compatible. This holds good in all kinds of grain as well as fruits. Manure imperfectly digeſted, or uſed in too great abundance, often defeats the views and hopes of the planter; he may reap a great burthen of ſtraw and very little corn. The ſame thing may happen from green vegetable manure, unleſs it be ploughed in time enough to undergo a thorough fermentation, and at the laſt ploughing be intimately blended with the ſoil. But of this there is no danger in the laſt-mentioned method of cultivation; for the principles of vegetation derived from the atmoſphere, by thoroughly pulverizing the ſoil, are ſo perfectly digeſted, ſubtilized, and refined from the impurities of the former, that unhealthineſs or a ſurfeit is not to be apprehended, eſpecially as it is not given all at once like the former, but adminiſtered from time to time as the ſkilful huſbandman may ſee neceſſary.

I ſhould now proceed, according to my propoſal, to conſider of the eaſieſt and moſt effectual means of promoting vegetation, in ſupport of, and conſiſtent with, the above principles; but as I apprehend that would run this paper to an inconvenient length, I muſt poſtpone it for ſome future opportunity. I am, &c.

North-Bockhampton, JOS. WIMPEY.
Hants, Dec. 1785.

Article XXIV.

A Practical Enquiry concerning the moſt certain and effectual means of promoting Vegetation.

[By the Same.]

Gentlemen,

IN a former paper I attempted to ſhew that there is a natural relation or connexion between the animal and vegetable kingdoms. That as the animal kingdom lives on, and is wholly ſubſiſted by, the vegetable; ſo is the vegetable no leſs maintained and ſupported by the animal. Each by turns being mutually the ſupport of, and ſupported by, the other.

If this theory be juſt, animal ſubſtance, from whatever ſubject it is derived, or under whatever form it may appear, when it is perfectly digeſted and putrified, ſubtilized and become volatile, is the true, genuine, and ſole aliment of plants. The dunghill, which conſiſts chiefly of animal excrements, contains the greateſt quantity of nutritive principles of any ſubſtance whatever of equal dimenſions, the conſtituent parts of animals only excepted. The dunghill, therefore, is the greateſt and moſt powerful fertilizer of land; and could the farmer acquire as much of it upon moderate terms

terms as he choſe, he might ſoon make his land as fertile as the climate would admit, or he could deſire. But in moſt ſituations, the quantity to be got, as every one knows, bears a very ſmall proportion, indeed, to the quantity wanted.

As a ſubſtitute and ſuccedaneum to the dung-heap, ploughing in green vegetables has been adopted with ſucceſs. This practice is a kind of improved fallowing; for though the land be cropped, its produce at a proper ſeaſon is ploughed in, and no preſent profit is derived from it. The land therefore may be properly ſaid to be under fallow, until by future culture it is in fit condition to receive the ſeed of a future crop.

But the more general practice is, when the land has been exhauſted by having been too frequently cropped, and is become foul and full of weeds, to give it a year's fallow; or ſometimes two winters and a ſummer's fallow, which is often neceſſary to eradicate the weeds, thoroughly pulverize the ſoil, and render it ſufficiently fertile to bear a crop of wheat. But when a man enters upon a farm that has been racked out by the former tenant, and the whole of it left in the ſad condition above repreſented, to give it a year's fallow, without receiving any beneficial return, would to moſt

prove a ſevere trial both to their patience and their pockets.

Mr. TULL, to whoſe memory the moſt grateful tribute of reſpect is due, has in a great variety of inſtances ſhewn to what an amazing degree of fertility even very poor land may be brought by repeated and frequent breaking, dividing, and pulverizing the ſoil. The truth and propriety of his principles are generally allowed, and indeed cannot be well controverted, how much ſoever the mode he adopted, and his method of applying them, may be decried by ſome, and by the peculiar circumſtances of the land of others rendered impracticable. The ſoil of his eſtate was in general light and fragile, and in all reſpects peculiarly ſuitable to his mode of practice. All land, whatever may be its temperature, may be fertilized and improved by frequent ploughing and harrowing, if they are well timed; but all land is not equally ſuitable to the drill and horſe-hoeing culture; and ſome, though perhaps comparatively little, not at all ſo. Hilly countries, land that is rocky or abounding with large looſe ſtones, or that conſiſts of a ſtrong, moiſt, adheſive clay, is not in general ſuitable to the drill culture; but the land that is not ſuitable, I apprehend, bears no great proportion to that which is. The intelligent huſbandman, who

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is convinced of the truth of the principles, will readily vary the application of them as circumſtances may require.

When land is exhauſted, quite out of tilth, and overrun with the ſtrongeſt and moſt noxious weeds, it is abſolutely neceſſary to eradicate them, to clean and pulverize the ſoil; otherwiſe the ſeed, whatever it may be, might as well be thrown on the highway, as ſown in land in that condition. It is a queſtion of great importance, how and by what means land may be fertilized and its vigour reſtored, the weeds diſplaced and deſtroyed, conſiſtently with the beneficial culture of a profitable crop growing on the ſame field at the ſame time. It will readily occur to the reader, that this is not poſſible to be done in any mode of culture but that of planting in drills, and pulverizing the ſoil by ploughing and horſe-hoeing the intervals during the growth of the crop through the whole ſummer. Mr. Tull rightly adviſed well-timed ploughing and harrowing, till the land was thoroughly pulverized and well cleaned of weeds; for the grain and plants, which were chiefly the ſubjects of his culture, would by no means admit of being ſown in an exhauſted ſoil overrun with weeds with the leaſt proſpect of a crop, though it may be ever ſo certain that the growth of the ſeveral articles he cultivated

was promoted in the moſt beneficial manner by the due uſe of the horſe-hoe, or hoe-plough.

Wheat, turnips, lucern, and ſainfoin, and indeed every other kind of plant, when well fixed and eſtabliſhed in the ground, may be greatly promoted in their growth by the diſcreet uſe of the hoe-plough; but previous to the uſe of this inſtrument, they muſt have arrived to a certain ſtage of their growth, otherwiſe the hoe-plough would entirely diſplace and totally deſtroy them. It is therefore abſolutely neceſſary, that the land in which theſe articles are to be ſowed, ſhould at leaſt be moderately fertile, and very clean from weeds, which can be effected only by being thoroughly pulverized previous to its being ſowed.

Turnips, lucern, ſainfoin, clover, and many others, are very precarious articles, even when ſkill has been uſed, and great pains taken, to inſure a crop. Land is ſometimes ſowed with turnips three or four times to no purpoſe, and many other crops frequently miſcarry through circumſtances which human ſagacity cannot foreſee, nor human prudence remedy. The failure of theſe articles is generally imputed to the ravages of the fly, and true it is that they prey upon them by millions; but if my obſervations are juſt, the evil does not begin

begin there. It is common for the ſeeds of the above-mentioned plants to come up finely and look healthy; but heat and drought coming on, the juices of the young plants thicken and ſtagnate, circulation is ſtopped, they wither, and are ſuddenly deſtroyed by the fly. It is very common to ſee whole fields in this condition, excepting under the ſhadow of the hedges, which in ſome meaſure retain the dews of the nights, and ſcreen the young plants from the ſcorching ſun-beams. We frequently ſee very flouriſhing plants under hedges, when the crop of the reſt of the field is entirely deſtroyed; and I am clearly of opinion, the ſame diſappointment would happen in every poor ſoil, if the appearance of the plants were immediately followed by a few dry hot ſcorching days, though there ſhould not be a fly to prey upon them. The beſt means to guard againſt ſuch a diſappointment, when any of theſe articles are to ſtand for a crop in the place they are ſowed, is thoroughly to cleanſe the ground, duly break, divide, and pulverize the ſoil, and dreſs it with a well-prepared artificial compoſt, which, if the ſeaſon ſhould not prove ſingularly unfavourable, would moſt probably give a degree of vigour to the young plants, which would totally defeat the ravages of the fly; and if the land were to be ſown in drills, a very moderate quantity of the compoſt being re-

gularly ſpread in the path of the drill previous to the ſowing the ſeed, would be ſufficient for the purpoſe.

A plentiful crop of turnips, or of artificial graſſes, is a matter of very great importance to a farmer who has a large ſtock of cattle to feed; it therefore merits his moſt ſerious attention, how and by what means he may render the growth of thoſe articles more conſtant and certain, which in the common courſe of practice are very precarious, and not to be depended upon. For this purpoſe, I would adviſe him to keep twenty, thirty, or fifty loads (the quantity proportioned to the extent of his farm) of a good compoſt always by him, ready prepared, to be uſed as occaſion may require. This may be done at a very moderate expence in the following manner:——

Of a field that is conveniently ſituated, plough and harrow the headlands, till the ſoil be well divided and in fine tilth; then take a cart-load, or forty buſhels, of good ſtrong well-burnt lime, freſh from the kiln, and place it in little heaps, about a buſhel in each, along the middle of the ſaid headlands, about four feet diſtant from each other. This done, with a ſhovel cover the heaps of lime with four or five times its quantity of pulverized earth,

and

and pat it down cloſe with the back of a ſhovel, ſo as to exclude both the rain and the air. In a few days, the moiſture of the earth will have diſſolved the lime, and reduced it to a powder. A workman, however, ſhould from time to time inſpect the heaps, for they will ſoon begin to heave and ſwell, and have large fiſſures in them, which muſt be carefully filled up by having more earth thrown upon them, and patted down cloſe. This muſt be repeated as often as occaſion may require; for rain would cauſe the lime to run into a kind of irreducible calx, and the air would rob it of its fertilizing quality, as it is well known it does of its medicinal virtue. When the lime is perfectly reduced to a powder, the earth and lime muſt be chopped down with a ſpade, and intimately blended and incorporated together. This is moſt conveniently done in form of a long bank or ridge, in the middle of which a large furrow or opening muſt be made ſufficient to receive five cart-loads (forty buſhels each) of good fat ſpit dung; then the earth and lime muſt be thrown over the dung ſo as to cover the whole. In this manner it muſt lie ſome months, or till the dung is in a ſtate of diſſolution, which it will ſoon be by means of the lime. When arrived to this ſtate, it muſt again be turned over, and incorporated as intimately as poſſible, and then formed into a heap to be kept for uſe. Earth,

lime,

lime, and dung, thus managed, conſtitute an unctuous ſaponaneous maſs of great fertility, and perhaps this is the moſt beneficial method of manuring with lime of any in uſe; for at the ſame time that it promotes the growth of the crop, it meliorates and improves the ſoil; whereas, in the common way of uſing it, it is thought by moſt, that though it may invigorate for a crop or two, yet it infallibly impoveriſhes the land. It is true, however, that there is no article in the whole art of huſbandry, concerning which even practical men are more divided, than about lime. Some declare they have expended large ſums of money in the uſe of it, without deriving the leaſt benefit from it; with others, it is the *ſine qua non* of vegetation; without it, they think they had better not ſow their land; indeed, the practice ſo far prevails in ſome counties, that the tenant is tied down by an article in his leaſe to lay on a certain quantity every third or fourth crop, from ſixty to one hundred and ſixty buſhels an acre. It is not difficult to account for this ſeeming irreconcileable difference of opinions, but it would require more room and time than can be allowed at preſent. I will only add, that a compoſt formed as above, would make an excellent top-dreſſing to be uſed in the ſpring, and if not wanted for the purpoſes firſt mentioned, would be very uſeful for the laſt. But from this long digreſſion, let us return to our ſubject.

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We will ſuppoſe the land we have to cultivate is in its nature rather poor and unfertile, and rendered more ſo by being too frequently cropped, and its culture neglected, and conſequently overrun with the worſt kind of weeds; the queſtion is, what mode of culture will bring ſuch land into proper tilth, and produce a profitable crop at the ſame time with the leaſt expence? To anſwer this purpoſe, I have already obſerved, the crop muſt be planted in rows with intervals ſufficiently wide to admit the free uſe of the hoe-plough whilſt the crop is growing, as often as the growth of the weeds requires it. This will be three, or perhaps four times, in ſuch foul land, during the courſe of the ſummer. For this purpoſe I know only of three or four articles which will by any means anſwer. Theſe are, the different ſpecies of cabbage plants, beans, potatoes, and perhaps peaſe. I have tried carrots, parſnips, turnips, turnip-rooted cabbage, lucern, ſainfoin, and every ſort of grain, but without the leaſt ſucceſs; for in ſpite of every effort, the weeds baffled all attempts, and deſtroyed the young plants that aroſe from ſeed, before the hoe-plough could be introduced. Cabbages, beans, and potatoes, were all the articles that afforded a profitable return. The field in which I made my experiments is ſeven acres, and was exactly in the poor condition above deſcribed. The method I

purſued

purſued to bring this field into proper tilth is as follows, and I believe a better cannot be deviſed.

As ſoon as harveſt is well over, give the field a clean ploughing in the uſual manner. Dragging and harrowing at this ſeaſon can ſeldom be of any uſe; the earth is generally too adheſive to part with the roots which bind it together. As ſoon as the ploughing is finiſhed, give it another directly acroſs the firſt; but this muſt be performed in a manner very different from the former. Begin at the farther end of the field, and with one bout of the plough, make the furrows as deep, and the ridge as narrow and as high as may be. Upon the outward edge of the outward furrow enter the ploughſhare, and with another bout of the plough form a ſecond ridge, and ſo proceed through the whole field. It will then lie in deep open furrows, and high narrow ridges, and conſequently expoſed to the influences of the atmoſphere in the largeſt extent of ſuperficies that is poſſible. If the winter ſhould prove ever ſo wet, the ridges will be kept dry by the open furrows; but if it ſhould prove ſevere, the froſt will penetrate quite through the ridges, and impregnate almoſt the whole of the ſoil they contain. If in the latter end of February, or any part of March, the weather ſhould be dry and open, the ridges may be drawn down by the drags, and

and the field levelled to prepare it for planting. The advantage of this method muſt needs be evident to every practical man, for nothing in art or nature renders even the moſt adheſive ſoil ſo ſhort and friable as expoſing it through the winter to the froſt.

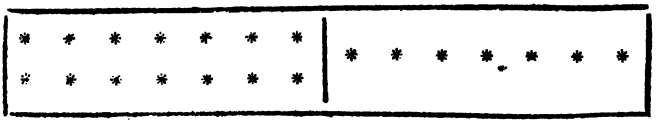
This being the ſtate of the field, we proceed now to prepare it for planting. On the further ſide of the field, about a yard diſtant from the hedge, draw a furrow with the plough from one end of the field to the other, and return the plough again in the ſame furrow. This will make it wide, deep, and clean. Then enter the ploughſhare about nine inches diſtant from the edge of the furrow, and with one bout of the plough, throw the earth on each ſide into the middle of the furrow. A ſecond bout of the plough, performed in the ſame manner, will form a high ridge about three feet wide. It is evident, a ridge thus formed will, under the crown or moſt elevated part of it, have *twice* the depth of pulverized earth that can be had in common ploughing. The whole field is to be formed into ridges in the ſame manner as the firſt. In land that is tolerably clean, and in pretty good tilth, the intervals between the ranks of plants on the tops of theſe ridges will be wide enough for the hoe-plough to work, and keep it ſo. But land

in

in the ſad condition above deſcribed, might be more conveniently and effectually cleanſed and improved by forming the ridges by the bouts of the plough, which would make them about four feet and a half wide, and conſequently there would be intervals of near four feet for the hoe-plough to work in. If the ſeaſon ſhould prove favourable, and the intervals ploughed three times in the courſe of the ſummer, the ſoil would be reduced almoſt to a powder.

Let us ſuppoſe then the field to be formed into *three-bout ridges* as above, and the time for planting beans arrived; with a common plough I make a clean furrow on the crown of each ridge, about a foot wide, and four inches deep, going down one ridge and up the next, and ſo on through the whole field. The beans are then dropped in the furrows, either in two rows, ſeven or eight inches aſunder, or in a ſingle row in the middle of the furrow, as repreſented below, No. I. No. II.‡ If the ſeed be good, the diſtance may be three inches bean from bean; if otherwiſe, they ſhould be

‡ No. I. No. II.



planted

planted cloſer. This may be performed very conveniently by a ſmall hand-barrel drill, with which a boy might plant ſix acres a day; or for want of ſuch an inſtrument, the beans might be dropped by women, boys, and girls, very expeditiouſly; as the furrow would be an infallible guide, which they could not miſtake either in the rows or depth, though they might ſomewhat in the diſtance of the beans; but as the furrows would remain open for the preſent, every error would be liable to detection.

The beans being planted, they may be very expeditiouſly covered by a pair of harrows being laſhed to a couple of poles at a proper diſtance to work on the tops of the ridges, and drawn by a pair of horſes; one going in each furrow, two ridges may be covered at a time, without the horſes ſtepping upon either.

A drill, which makes the furrows, drops the ſeed, and covers it at the ſame time, conveys an idea of much greater perfection than the method here adviſed; but all things conſidered, I do not know but in practice this may be the more eligible method of the two, eſpecially for beans and peaſe; and for ſetting potatoes and cabbage plants, I think it greatly preferable to all others. A furrow made as above is vaſtly preferable to any channel that

can

can be made with the ſhare of a drill; for though the ſhare be ſet to a certain depth at the diſcretion of the ploughman, from which it cannot deviate, yet if the ſoil be well pulverized, as it ought, it will run into the channels, and cauſe the ſeed to lie at unequal depths; this, in the autumn indeed, may be of no conſequence, as at that ſeaſon there is no danger of wanting moiſture to make the ſeeds vegetate; but in the ſpring, it is of the utmoſt conſequence to have the ſeed buried at an equal and proper depth; to the want of which, the very ſhort crops of barley and oats were almoſt entirely owing the laſt ſummer. The ſeed that lay three or four inches deep came up well, and ripened in good time; but what lay ſhallow, either never came up at all, or, which was much worſe, ſo late, as not to be any thing near ripe; it was therefore cut green, and lay ſo long to wither before it could be ſafely houſed, that what little was ripe and would have been good, was much reduced in its value by laying ſo long in the field. I am very clearly of opinion, that if the barley laſt ſeaſon had been drilled in equally diſtant furrows of four inches deep, and about a foot from each other, the crop in this country had been three times as great at leaſt, though much leſs than half the ſeed would have been ſufficient; this would have made a difference of three rents at leaſt to the farmer.

The

The beans being planted, ſuppoſe the beginning of March, before the end of April a plentiful crop of weeds may be expected, notwithſtanding the pains that have been taken to prevent it. Thoſe which are in or near the rows of beans, ſhould be cut up with the hand-hoe; and the ſooner this is done the better, after the beans are high enough for the hoer's direction. The weeds in the intervals may ſtand ſomewhat longer, till the beans are ſufficiently eſtabliſhed in the ground, ſo as not to ſuffer from the free uſe of the horſe-hoe. At this ſtage of their growth, this inſtrument ſhould be introduced, and a furrow cut as near one of the ranks as may be with ſafety, and the earth thrown into the interval; on its return it muſt cut a furrow on the other ſide of the row, and ſo on till the whole field be finiſhed. There will then be a furrow on each ſide of the rows, and high ridges in the middle of the intervals. Theſe ſhould be well harrowed, with an inſtrument made of a proper width to paſs between the rows without injuring the beans. This would level the ground, break the clods, and tear out many of the weeds. A plough with a double mould-board is then to ſplit the ridges in the middle of the intervals, throwing one half to the right, the other to the left, to earth up the beans. Thus diſpoſed, it may remain for a month or ſix weeks, or till the weeds appear. Then the

hoe-plough

hoe-plough ſhould be ſet to work again, always obſerving to go as near the rows as may be with ſafety. The harrow ſhould follow the hoe-plough, and the plough with a double mould-board the harrow; and this is to be repeated as often as there may appear to be any occaſion, which cannot well be more than three times in the courſe of the ſummer.

It makes no material difference whether the crop be beans, potatoes, or cabbage. That mode of practice which is beneficial to one, will be equally ſo to all. A field under this mode of culture, it is evident, would have all the advantages of a year's fallow, together with a beneficial crop. The beans being reaped and carried, the field would be thought by moſt to be in very good tilth for a crop of wheat. Nothing more would be neceſſary than to plough and harrow the intervals, which might be done with two bouts of the plough in each interval, in which two, three, or four rows of wheat might be drilled at the diſcretion of the owner. But I ſhould prefer giving it another winter's fallow, which ſhould be performed exactly in the ſame manner as the former. You may then either have another crop of beans, or, which I think much better, a crop of potatoes. The land is to be prepared and to lie fallow through the winter, as before directed for beans. The beſt

ſeaſon

ſeaſon for planting beans in March, but potatoes ſhould not be planted before the middle of April at ſooneſt; but in moſt years, the beginning of May is ſafer and better.

Laſt year I planted about three quarters of an acre the 15th and 16th of April; they came up well, and looked very fine and vigorous. On the morning of the 21ſt of May, there was a ſharp hoar froſt, which ſhrivelled up the greens of the potatoes as if they had been ſcorched by fire; the conſequence was, the ſtalks died down to the ground, and appeared as if all deſtroyed; however, in ſome time they ſhot forth again, and produced a better crop, all things conſidered, than I expected. The produce was thirty-ſix ſacks and a half on three quarters of an acre, (240lb. to the ſack) which at four ſhillings a ſack, (the preſent price here) come to 7l. 6s. being after the rate of 9l. 14s. 8d. per acre. Had this land been prepared in the manner above deſcribed, I cannot have a doubt but the produce would have been double at leaſt. The land was in wheat the preceding year. I could not get poſſeſſion till January 1785, and by reaſon of ſnow and hard froſt, it could not be ploughed till late in March. It was thrown into narrow ridges, by two bouts of the plough; and the potatoe ſets, inſtead of being planted in the furrows

made on the crowns of the ridges, as I had directed, were, by a moſt unaccountable blunder, very injudiciouſly dropped on the hard bottoms of the parting furrows between the ridges. I had no remedy left to correct this miſtake, but by running the plough up each ſide of the furrow; by this means new ridges were formed with the potatoe ſets exactly under the crown of each ridge, and the ſets were well covered with mould very well broken; but ſtill they lay on a bed of hard uncultivated earth, which is a very great impediment to vegetation; for though the potatoe generally grows above the ſet, the roots and fibres which furniſh it with nouriſhment penetrate deep and every way in a well-prepared ſoil.

Nothing encourages and promotes the growth of all kinds of plants ſo much as breaking the ſoil as deep as the ſtaple of the land will allow; and it is for this reaſon that I adviſe deep clean furrows ſhould be opened, and the crown of the ridges, which are to be planted, ſhould lie exactly over them. The furrows on the tops of the ridges need not be more than four inches deep for beans; but it muſt be ſix *at leaſt* for potatoes; for almoſt the whole of their produce is above the original ſet, and therefore ſhould have ſix or eight inches to grow in.

A field

A field thus planted with potatoes following a crop of beans, if duly cultivated with the hoe-plough, harrow, and plough with a double mould-board, as above-directed, would reduce almoſt any ſoil to a perfect tilth. The intervals might be prepared in good time for a crop of wheat, and the ſeed drilled in, if convenient, before the potatoes were taken up.

Fallowing land has been generally practiſed to reſtore its fertility, eſpecially where manure is not to be got in ſufficient quantities; and all experience ſhews that the practice is right. But none have or can have an adequate idea of the great benefit of keeping the ſoil in a thorough pulverized ſtate, except thoſe who have paid a cloſe attention thereto.

In a very hot and dry ſeaſon, I have ſeen cabbage and other plants which were withering and dying, ſeemingly beyond a poſſibility of recovery, reſtored in a very ſhort time to a vigorous ſtate, merely by deep hoeing, and earthing them up well. I will quote one inſtance in particular, becauſe it is a very remarkable one:——

The field above-mentioned of ſeven acres, I uſe for a field of experiments. About three quarters

of an acre of it I had dug with the ſpade, in order to mark the difference between that inſtrument and the plough. A plot of the ground thus dug was planted with beans, in rows three feet aſunder, and about four inches apart in the rows. It was wheat ſtubble, very poor, and full of weeds, and dug but once. The beans came up well, but the ſeaſon proved moſt unpromiſing. When three or four inches high, they appeared to be ſtruck with the blight, and the tops were infeſted by a great number of inſects, not unlike a large bug, which made great havock among, and threatened the deſtruction of the whole, for the plants declined faſt. I thought a fair opportunity now offered of trying what benefit might be derived from effectual cultivation. I cauſed them to be deep and well hoed, and the earth drawn up to the ſtems of the plants; the good effects of this were ſoon viſible, their verdure returned, and they tillered out afreſh; the weeds too came up very thick and ſtrong, and grew apace. I then had the intervals dug full ten inches deep, and the weeds in the rows pulled up. This gave freſh vigour to the plants, they kidded finely, and totally overpowered the weeds for that ſeaſon. A few rows of theſe beans were gathered green for the uſe of the family, the remainder ſtood for ſeed. Many of them, eſpecially thoſe that were gathered green, put up freſh ſhoots from the roots,

roots, grew very ſtrong, and even as full of bloom before winter as they had been in the ſummer. Many of them filled very well, and we had two or three dreſſings as good and as well flavoured as any of the ſummer. To have two crops of beans from the ſame roots, is, I believe, a very uncommon inſtance of vegetation, and certainly was owing to nothing but well-timed and effectual hoeings and digging the intervals. The remainder of the plot ſtood for ſeed; the ſeaſon for getting them in being rather unfavourable, ſome of the pods opened, and the beans dropped. As ſoon as they were houſed, the ground was well dug to prepare it for a winter crop. The beans that were ſcattered were dug in unnoticed, and before the end of November were ſhot up two feet high, very ſtrong and luxuriant. I took up ſeveral of them carefully, to obſerve the progreſs of their growth. The beans from which they ſhot firmly adhered to the ſtalk, from whence it appeared, that in digging the ground ſome of them had been buried ſeven or eight inches deep, it being ſo much from the bean to the ſurface of the ground, and this, inſtead of a ſtalk, had put on the appearance of a root, and was full of lateral branches and fibres the whole length. Below the bean the root had penetrated, in ſome eleven, in others twelve inches. How much of the fine fibres might be broken off cannot be known. Cer-

tain it is, however, that the perpendicular growth of theſe roots was from eighteen to twenty inches; whereas thoſe that were planted in the ſpring on the ſame ſoil, much out of condition, very foul, and but once dug, had ſtruck only about three inches deep at moſt. Here then we have ocular demonſtration of the ſurpriſing effects which breaking, dividing, and pulverizing the ſoil, can produce, if done effectually, and in proper ſeaſon. How amazingly great muſt be the luxuriance of a plant whoſe root is twenty inches long, and full of fibres the whole length, if compared with one of the ſame kind whoſe root is only three inches long, and proportionably ſmall!

Another plot of the ſame field I planted with egg peaſe; they came up well, but when a few inches high, were ſtruck with the blight, and devoured by inſects down to the ground. I began to dig them up, in order to plant ſomething elſe in their room; but obſerving the roots had begun to put out freſh ſhoots, I took the man off digging, and ſet him to hoeing the intervals very deep. They ſoon ſhewed the good effects of this operation, they ſhot up vigorouſly, and produced not a large crop indeed, but very fine large peaſe. When they were nearly ſpent, I had the ground well dug again, and planted ſome hundreds of cabbage plants

plants of different kinds. To theſe I gave two or three good hoeings, and in October had the fineſt cabbages in the neighbourhood. Perhaps many might be larger and heavier, the average weight of mine being from ſix and a half to ſeven pounds; but nothing could exceed them in ſweetneſs and goodneſs. What makes this the more remarkable is, the farmer who laſt occupied the land told me it would not bear a cabbage, the ſoil was ſo ſhallow, poor, and liable to burn.

As ſoon as the cabbages were cut, I had it dug again, and planted it with brocoli; the plants grew luxuriantly, and were as healthy and fine as ever were ſeen, till the ſevere froſts the beginning of January inſtant gave them a ſevere blow. Before the ſnow fell, they dropped their leaves, and ſeemed much hurt; whether they will recover, as I hope, will appear hereafter; they are now covered with ſnow.

The condition as well as complexion of this part of the field (three quarters of an acre) is very much altered for the better; it has now the appearance of good garden mould, is light, eaſy to dig, and crumbles with great eaſe. This improvement of the ſoil is wholly owing to the culture beſtowed upon it. In the courſe of twelve months it has been dug three times, and hoed or dug with a dung-fork with

with four tines (which is the beſt inſtrument I know of for ſhaking the weeds out of the ſoil) at leaſt four times, but it never had a grain of manure of any kind whatever; *that* I purpoſely withheld in order to prove to what degree of improvement land might be brought by the force of cultivation ſolely. Hitherto the ſucceſs has greatly exceeded my expectation; if the ſucceſs of another year upon this ſame part of the field ſhould prove ſuperior, or even equal to the laſt, the fact will be eſtabliſhed beyond the poſſibility of a doubt, that land in its nature rather unfertile, impoveriſhed, and made very foul by bad management, may, by the proper uſe of the ſpade and hoe, or the plough and harrow, be made fertile, and to bear profitable crops, without the leaſt aid from manure of any kind whatever.

It has been obſerved by Mr. TULL, and by others ſince his time, that frequent ploughing and harrowing, and reducing the ſoil to a perfect tilth, increaſe and extend the paſture of plants; but this could be of no great uſe, if the matter or ſubſtance which conſtitutes their aliment were not increaſed alſo. During the courſe of theſe experiments, I made ſeveral obſervations, which clearly explain to my own ſatisfaction, how dividing and pulverizing the ſoil becomes the proper mode of conveying the aliment, prepared by nature for the ſuſtenance of plants,

plants, into the boſom of the earth. One obſervation I will mention, as it is directly to the purpoſe: one evening, near the time of the men's leaving work, a ſmart ſhower of rain came on, which drove them off. They were digging one of the plots where the beans had grown. The ſhower did not laſt above half an hour. The next morning, as the men were digging, I obſerved the rain had not penetrated above half an inch into the ground at moſt; I ordered one of them to dig two or three ſpits of the ground that had been dug the day before; it clearly appeared that the rain in the new-dug ground had gone as deep as the ſpade, which was full twelve inches. Here then, we clearly ſee how, and by what means, the principles of vegetation are acquired, by keeping the land in thorough cultivation.

Rain, hail, ſnow, dews, hoar froſt, and all the exhalations which occupy the atmoſphere, ſink into and are abſorbed by the earth when it is kept in a looſe, light, pulverized ſtate; whereas the ſame principles on a compact hard ſoil reach no farther than the ſurface, and are exhaled by the ſun and wind, with little or no benefit to the ſoil they fall on.

From hence alſo we may learn the *modus operandi* by which plants in a growing ſtate may be invigorated

gorated and rendered luxuriant. If plants of any kind were planted in rows, according to the practice of the new huſbandry, and the intervals horſehoed two or three times in the ſummer; every ſhower of rain, yea, the dews of the nights, would be freely imbibed by the well-pulverized ſoil, and the aliment it contains directly conveyed to the roots and fibres of the plants which occupy the intervals.

That the true aliment of plants is derived from animal ſubſtances, diſſolved and volatilized by fermentation and putrefaction; that the atmoſphere is the grand receptacle of all putrid effluvia; that this ſubtilized matter enters into, and helps to conſtitute, the clouds and other meteors; that it attracts, and is attracted by, hail, rain, ſnow, &c. and by that means returned to repleniſh and fructify the earth; the writer himſelf is fully convinced. But ſuppoſing his theory reſpecting the principles of nutrition be ever ſo erroneous, it is of no conſequence to the practical huſbandman; it is ſufficient for him to know and to be well acquainted with a mode of practice which will infallibly render his fields fertile, and capable of producing profitable crops, by means eaſily practicable and within his own power, be the ſituation and condition of the ſoil whatever it may, total barrenneſs excepted.

That

That fallowing gives fertility to the earth, is a fact confirmed by univerſal experience, and well known to every huſbandman: but the extent of its power has been conſidered by few, and attempted to be carried to its utmoſt pitch perhaps by nobody. I am of opinion, that even Mr. TULL's mode of practice would admit of very conſiderable amendments. But this Paper is much too long to allow of any large addition.

I am, &c.

North-Bockhampton,
Hants, January 1786. JOS. WIMPEY.

N. B. We acknowledge ourſelves much indebted to Mr. WIMPEY for the foregoing (as well as divers former) valuable papers. He will therefore excuſe our ſubjoining the following remarks, made by an ingenious gentleman, who has enriched our work with many intereſting practical papers; and to whom the Eſſay was referred.

REMARKS.

"Mr. WIMPEY's Practical Enquiry has afforded me much inſtructive amuſement. I never ſo nearly agreed with any other practical or theoretical farmer. His Eſſay is ſo deſerving of the higheſt encomiums, that it is with reluctance I make any comment thereon which may ſeem to claſh with any of his opinions. But by my pointing out the only

only few trifling circumſtances in which we differ in judgment, you will ſee how generally conſonant our ideas are with each other.

" Mr. W. thinks that ' all land may be fertilized and improved by frequent ploughings and harrowings, if well timed.' But it appears from experience, that many *light* and *thin* ſoils receive detriment rather than advantage from frequent ploughings; particularly in ſummer, when the ſun exhales the oleaginous and nutritive particles in great abundance. The experience of Mr. BILLINGSLEY (who, without a compliment, is one of the beſt farmers in the Weſt of England) exactly coincides with my own in this reſpect.

" Mr. W. ſays, ' Turnips, lucern, ſainfoin, and clover, are very precarious crops.' All crops, with imprudent management, or in very unkindly ſeaſons, muſt be precarious; but I do not think the term *precarious* particularly applicable to thoſe above-mentioned, turnips excepted; and the inſtances of a material failure, even of that crop, are very rare in the Eaſtern counties. Lucern, unleſs ſown in drills, and kept clean from weeds, will never anſwer to the farmer; but when judiciouſly managed, nothing is more profitable. Clover ſeldom fails, unleſs in patches on wet lands, which want under-draining; and it is an excellent preparative for wheat.

" Mr. W. has given you an excellent method of raiſing a large quantity of manure. I have for many years adopted a mode nearly ſimilar, only ſubſtituting the ſpade inſtead of the plough in preparing my border and head-lands for the

the lime and dung. In the ſpring I have them dug deep and well, the workman dropping potatoe ſets, and covering them as he goes on. The crop more than pays the expence of digging, and leaves the land clean and finely pulverized.

"I think equidiſtant rows of twelve inches too wide for barley; having tried various experiments from three to twelve inches with that grain, from the general reſult, I prefer ſeven inches to every other diſtance. I wiſh, for the benefit of your Society, and the nation at large, you had many ſuch correſpondents as Mr. WIMPEY.

"H. J. CLOSE."

ARTICLE XXV.

On Raiſing, Planting, and Cultivating the Turnip-rooted Cabbage; on the Six-Field Syſtem; and ſome curſory Remarks on Agriculture.

[In a Letter to the Secretary.]

SIR,

THE beſt method I have yet diſcovered to raiſe the plants of the turnip-rooted cabbage, is to breaſt-plough, and turn as much old paſture as may be judged neceſſary for the ſeed-bed; two perch well ſtocked with plants, will be ſufficient to plant an acre.* The land ſhould be dug as

* See Sir THOMAS BEEVOR's letter, page 110.

ſhallow

ſhallow as poſſible, turning the aſhes in; and the ſeed ſhould be ſown the beginning of April.

The land intended for the plantation ſhould be cultivated and dunged as for the common turnip. About Midſummer, (or ſooner if the weather will permit) will be a proper time for planting, which is beſt done in the following manner: the land to be thrown into *one-bout* ridges, upon the tops of which the plants are to be ſet, at about eighteen inches diſtance from each other. As ſoon as the weeds riſe, I give a hand-hoeing, afterwards run my plough in the intervals, and fetch a furrow from each ridge, which, after laying a fortnight or three weeks, is again thrown back to the ridges; if the weeds riſe again, I think it neceſſary to give them another hand-hoeing.

N. B. If the young plants in the ſeed-bed ſhould be attacked by the fly, ſow wood-aſhes over them when the dew is on, which will effectually prevent the ravages they would otherwiſe make.

On the Six-Field Syſtem.

As I have tried different ſyſtems of agriculture, and found the following method beſt adpated to our poor lands, I have taken the liberty to preſent you with an account of it.

It

It is what we generally call a *ſix field ſyſtem.** As I look upon turnips to be the grand baſis upon which the beſt ſuperſtructure of practical huſbandry can be raiſed, I ſhall begin with them.

1ſt year, Turnips,

2d year, Barley, with graſs ſeeds.

As our lands have been ſown ſo frequently with broad clover as to become tired with it, I have ſubſtituted the following mixture in its place, viz. four pounds of white Dutch, ſix pounds of marl graſs, and one buſhel of hop and ray-graſs, which I have found to ſucceed.

3d year, Graſs,

Mown, not ſuffering any cattle to be depaſtured on it later than October; as I have ſeen many a good plant of graſs deſtroyed by winter feeding.

4th year, Feed.

5th year, Wheat.

The land lying under graſs two years, it gets cloſe, and will be a means to prevent the wheat from what is generally called *foundering* in the ſpring.

* This *ſix-field ſyſtem*, or, ſyſtem of a courſe of crops for ſix years, is a moſt excellent one; and its utility is further proved by the general practice of the beſt farmers in Suffolk and Norfolk, upon ſimilar ſoils; but it is cuſtomary in thoſe counties to break up the layer in the ſpring of the fifth year, and dibble in peaſe; and ſow wheat in the ſixth year after the peaſe; as they find the wheat generally better after a crop of peaſe, than when ſown or planted upon the layer; and they think the land leſs exhauſted by a crop of peaſe ſucceeded by wheat, than by a crop of oats following the wheat.

6th

6th year, Oats;
After which, Turnips.

As the getting a crop of turnips is the foundation on which you may moſt reaſonably build your future hopes of ſucceſs, it is a part of huſbandry to which the farmer cannot pay too much attention. The method I adviſe is, to carry all the rotten dung and manure upon your oat-ſtubbles immediately after harveſt, (which ſhould be the dung made in your courts the preceding year) after which plough it in; give another ploughing in March if poſſible; you will be then provided for an early ſowing, which, in my opinion, is the moſt probable way of ſucceeding in your turnip crop.†

As turnips upon poor lands cannot be raiſed without dung, I take it to be the farmer's intereſt to collect as much as poſſible, not ſuffering any

† The propriety of manuring the land for the turnip crop is indiſputable; but if the dung be laid on the ſtubble directly after harveſt, it will loſe much of its ſtrength before the ſeaſon of turnip ſowing. The Suffolk and Norfolk farmers generally carry their manure out of their farm-yards in the ſpring, as ſoon as the cattle quit them; and by turning it over once about a month afterwards, it becomes ſufficiently rotten to be laid on the ground immediately before the turnips are ſown. By this method abundant crops are produced.

ſtraw,

ſtraw, haulm, or ſtubble, to paſs without being converted to manure; as upon the quantity and application of *that* depends in a great meaſure his future ſucceſs.

The wheat ſtubble [haulm] ſhould be mown and collected together to ſome convenient place, as near to the land intended for turnips the next ſeaſon as convenient; and, being ſtacked round the ſheep-fold, will not only be of great benefit to the cattle as a ſhelter, but will be found very uſeful as a comfortable lodging for them.

I am aware of one objection that may be made to this method of bedding up cattle all the winter, which is, that the heat ariſing from the fermentation will make the cattle tender and delicate in their conſtitutions; but this, like many other things which at firſt appear an evil, may by proper attention be converted into the greateſt good, by laying on at proper times a layer of earth or mould from ditches, highways, &c.*

After the compoſt has early in the ſpring been turned up, this fermentation will be found to have converted it to a valuable heap of manure, and its

* Such a fixed fold may be of great uſe when the weather is too bad to fold the flocks in the fields; at other times the land will be more benefited by folding the ſheep upon it.

vicinity to the land where it is intended to be uſed muſt ſtill add to its value.

If manure could be conveniently procured to give a top-dreſſing to the graſs ſeed, as ſoon as the corn is carried, I am perſuaded the farmer would be amply paid for his expences in the ſucceeding crop.

I beg leave to ſubſcribe myſelf, with beſt wiſhes for the proſperity of the Society,

Your obliged humble ſervant,

THOMAS ROBINS.

Bold-Down, Glocceſterſhire,
January 7, 1785.

Article XXVI.

Experiment on Horſe-hoed Wheat.

[In a Letter to the Secretary.]

Sir,

AGREEABLE to my promiſe, I now tranſmit to you an accurate account of my *horſe-hoed* wheat with a comparative eſtimate of a full crop in the adjoining field.

The

The following experiments were made in two fields now parted by a ditch, but formerly in one piece, containing in the whole eleven acres; at this time they are in a ſix and five-acre cloſe. The ſix-acre field, after yielding two large crops of clover, was ploughed October the 18th, 1782, and on that and the following days planted with wheat on the firſt earth, allowing one buſhel of ſeed to each acre. In May following, the crop was properly cleaned by hand-hoeing. On the 12th of Auguſt twelve reapers cut it. After ſtanding a proper time in the field, it was brought home; and upon threſhing it, the ſix acres produced only eighty-four buſhels.

Oct. 16th, 17th, 1782, the adjoining five-acre field was *ſet* in ridges, planting two feet, and leaving two feet intervals, with two pecks of ſeed-wheat per acre; ten pecks the whole field. It was hand-hoed and cleanſed in the ſame method as the other crop, except that the intervals were *horſe-hoed*. It was reaped one day ſooner, ſtood in the field the ſame time, and was threſhed by the ſame labourers. The crop produced 128½ buſhels. This wheat ſucceeded a crop of potatoes, not manured for, but twice horſe-hoed. The tines of the frames made uſe of in planting were three inches and a half apart. There is at this time a very promiſing proſpect of a good crop on the laſt year's intervals.

Expences of the Six-Acre Field:

	£.	s.	d.
Planting, (at that time 10s. per acre, but now done at 6s.)	3	0	0
Hand-hoeing and weeding	3	0	0
Six buſhels of ſeed at 6s. 3d.	1	17	6
Rent of land	6	0	0
Tithe 1l. 4s. Town charges 15s.	1	19	0
Harrowing to cover the ſeed	0	1	6
Reaping and carting home	1	16	0
Threſhing at 18d. a coomb, becauſe the crop was mildew'd	1	11	6
Carting three miles to market	0	10	6
Total expence	£.21	0	0
Received for 84 buſhels, at 6s. per buſhel	25	4	0
Nett profit from the ſix acres only beſides ſtraw worth two guineas.	4	4	0

Expences attending the Five Acres, in the horſe-hoeing huſbandry.

	£.	s.	d.
Planting	£.1	5	0
Hand-hoeing and weeding	1	5	0
Two buſhels and a half of ſeed	0	15	7½
Rent of land	5	0	0
Tithe 20s. Town charges 12s. 6d.	1	12	6
Twice ploughing	1	15	0
Harrowing before and after planting	0	2	6
Reaping and carting home	1	5	0
Carried on	£.13	0	7½

Brought up	£.13	0	7½
Threſhing ſixteen quarters ——	1	12	0
Horſe-hoeing the intervals —	0	9	0
Carting to market — ——	0	16	0
Total expence	£.15	17	7½
Produce 16 quarters, ſold at 48s. per qr.	38	11	0
Value of ſtraw — ——	2	9	0
	41	0	0
Expences as above	15	17	7½
Nett profit	£.25	2	4½

Both theſe crops were damaged by the mildew; but the five-acre field leſs than the other. The ſix-acre field, however, had it received no ſuch injury, would never have yielded in any proportion to the other; as it produced in the ſtraw only ſix fair driving waggon loads; whereas from the five-acre field I had ſeven loads larger than are commonly laid up in harveſt time, although only half the land was planted. I am, &c.

Trimley, near Ipſwich, H. J. CLOSE.
May 18, 1784.

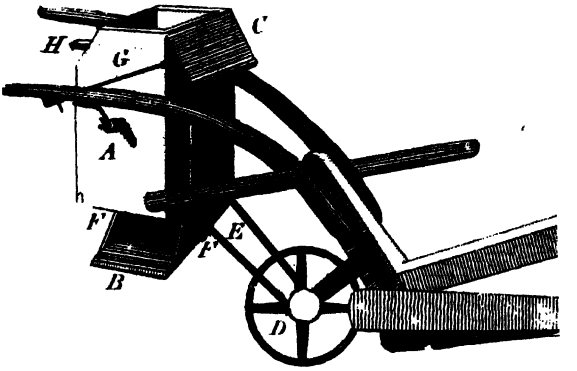
In a letter from Mr. CLOSE, dated February 1786, relative to the experiment on the five-acre crop above related, he adds as follows:—

" Since the above experiment was made, there have been two more crops of wheat taken from the field of five acres. In 1784 it produced ſix quarters per acre; in October 1785 the burthen in the ſtraw was not quite equal to the former year; but the ears being remarkably large and long, (ſome of them meaſuring 8 inches, and many containing 70 grains of corn) I think the crop, though not yet threſhed, may be ſafely eſtimated at ſix quarters per acre. This will make the return from the three years crops on the five acres, (with half the expence for ſeed, reaping, &c. without any aſſiſtance from manure, for which tillage has been ſubſtituted) amount to the ſum of 110l. 11s. or 36l. 17s. each year; a receipt far exceeding my moſt ſanguine expectations.

Pulverizing the land is wonderfully efficacious in ſtiff loamy ſoils; but in light, ſandy, and thin lands, too much ploughing will prove detrimental.

I have very conſiderably reduced the expence of planting wheat within theſe three years; it now amounts to no more than 6s. 4½d. per acre, with a frame having ſeven tines, or teeth; but I prefer a frame with only five, which reduces it 1s. 6d. more per acre, and makes the preſent price but 4s. 10½d. per acre.

ARTICLE

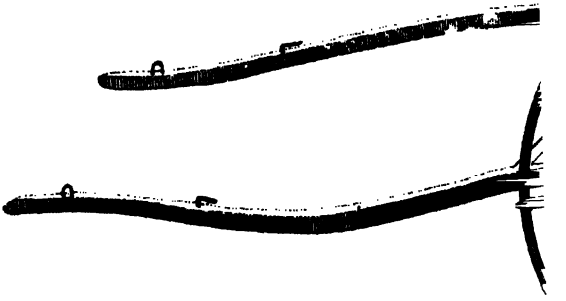


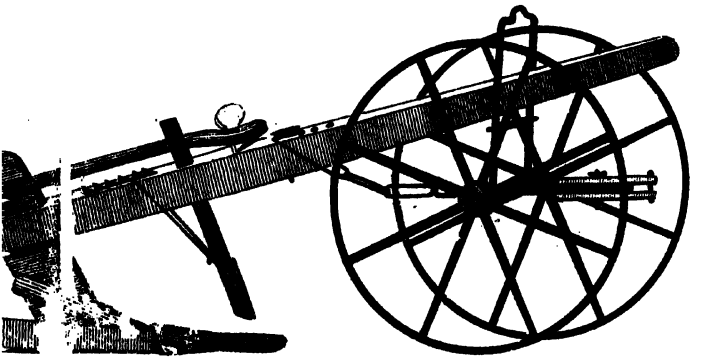
BY THE

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THE UNIVERSAL

SOWING MACHINE





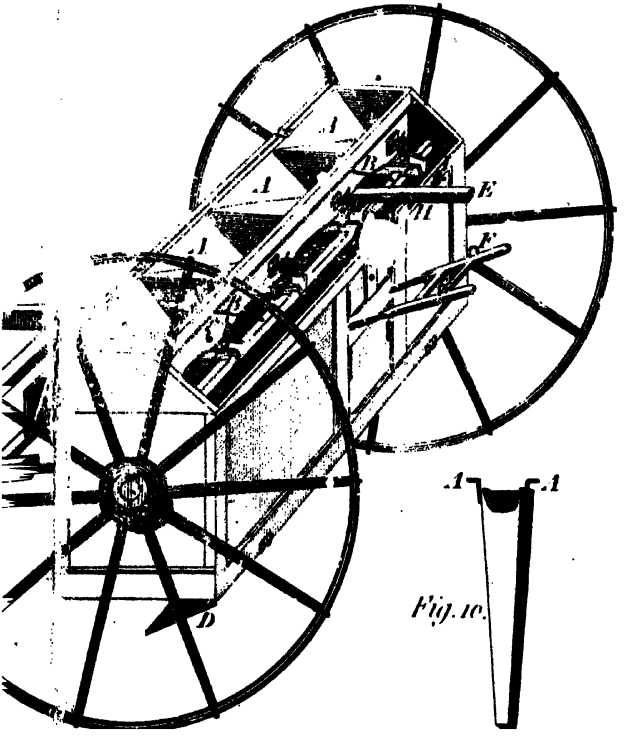


Fig. 10.

Fig. 3.

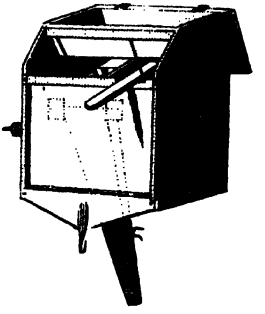


Fig. 1.

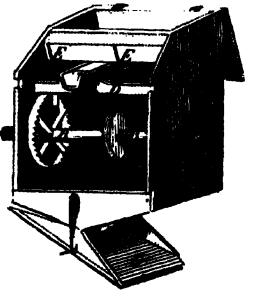


Fig. 7.

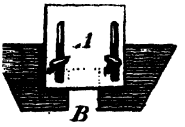


Fig. 6.



Fig. 5.

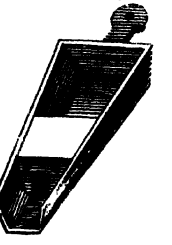


Fig. 8.

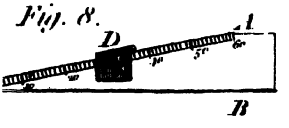
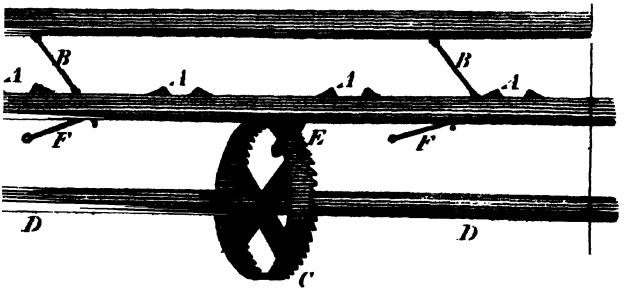


Fig. 9.



Article XXVII.

Deſcription and Uſe of the new-invented Patent Univerſal Sowing Machine, for Broad-caſting or Drilling every kind of Grain, Pulſe, and Seed.

[By Mr. John Horne, of Dover.]

THIS Machine, whether made to be worked by hand, drawn by a horſe, or fixed to a plough, and uſed with it, is extremely ſimple in the conſtruction, and not liable to be put out of order; as there is but one movement to direct the whole, nor does it require any ſkill in working. It will ſow wheat, barley, oats, rye, clover, cole-ſeed, hemp, flax, canary, rape, turnip, beſides a great variety of other kinds of grain and ſeeds, broadcaſt, with an accuracy hitherto unknown. It is equally uſeful in the new huſbandry, particularly when fixed to a plough; it will then drill a more extenſive variety of grain, pulſe, and ſeed, (through every gradation, with regard to quantity) and deliver each kind with greater regularity than any drill-plough whatever. When uſed in this manner it will likewiſe be found of the utmoſt ſervice to farmers who are partial to the old huſbandry, as, among many other very valuable and peculiar properties, it will not only ſow in the broadcaſt way with a moſt ſingular exactneſs, but

ſave

ſave the expence of a ſeedſman; the ſeed being ſown, (either over or under furrow at pleaſure) and the land ploughed, at the ſame operation.——It is needleſs to mention the very great beneſits that ariſe to the crop, from the ſeed being equally diſtributed upon the land, it being already ſufficiently known.

The prices of theſe machines* are brought within the reach of the ſmalleſt farmer; but were they much higher, it could not in the leaſt weigh againſt the advantages derived from them, as more than double the price of one may be gained, by uſing it a ſingle ſeaſon on a very ſmall number of acres.

Perhaps a fair and deciſive experiment for aſcertaining the ſuperior advantage of broadcaſting or

* The prices of the machine (excluſive of the packing caſes) are as follow: If conſtructed to be uſed with a ſingle furrow plough; the wheel, with the axle and cheeks ſteeled, ſtrap, regulator, braſs plates for broadcaſting or drilling turnips, lucern, tares, wheat, barley, &c. &c. &c. and every article neceſſary for fixing it, included, Three Guineas and a Half. If made with a ſpring, (for ſowing on the ſide of a hill, where the ſlope is conſiderable) but which is very rarely neceſſary, Five Shillings more. If made to be fixed to any double furrow plough, Four Guineas and a Half.

The large machine, Fig. 2, Plate I. when made to broadcaſt ſeven furrows at a time, and to be drawn by a horſe, Eight Guineas and a Half. If conſtructed to ſow five furrows at a time, and to be uſed by hand, Six Guineas. There are alſo Five Shillings more, if made with a ſpring.——Orders to be addreſſed to J. HORNE, the patentee at Dover; Mr. PEARSON, No. 169, Fleet-ſtreet, London; or to Mr. W. MATTHEWS, Bath.

drilling

drilling any particular crop, was never before ſo practicable; as the ſeed may now be put in with the utmoſt degree of regularity, in both modes of culture, by the ſame machine; conſequently, the ſeed will be ſown in both caſes with equal accuracy, without which it is impoſſible to make a juſt deciſion.

As the broadcaſt method of huſbandry is by far the moſt generally practiſed, and has long been conſidered the moſt productive, it may appear ſtrange upon reflection, that no machine has hitherto been made for the purpoſe of broadcaſting with certainty; when we find ſo many ploughs for drilling.

The excellence of this machine conſiſts in ſpreading any given quantity of ſeed, over any given number of acres, with a mathematical exactneſs, which cannot be done by hand; by which a great ſaving may be made in ſeeding the ground, as well as benefiting the expected crop.

There has always been a difficulty in ſowing turnip ſeed with any degree of exactneſs, both from the minuteneſs of the ſeed, and the ſmallneſs of the quantity required to be ſown on an acre. Here the machine has a manifeſt advantage, as it may be ſet to ſow the leaſt quantity ever required on an acre; and with an accuracy the beſt ſeedſman can never attain to.

It

It will alſo ſow clover, cole, flax, and every other kind of ſmall ſeed, with the utmoſt degree of regularity.

It will likewiſe broadcaſt beans, peaſe, and tares, or drill them with the greateſt exactneſs, particularly when conſtructed to be uſed with a plough.

Another advantage attending the uſe of this machine, is, that the wind can have no effect on the falling of the ſeed.

Of the Machine when made to be uſed without a Plough, and to be drawn by a Horſe.

THE Machine in this caſe may be made of different lengths at the deſire of the purchaſer. The upper part A A A A, ſee Fig. 2. Plate I. contains the hoppers, from which the grain or ſeed deſcends into the ſpouts. The ſeveral ſpouts all reſt upon a bar, which hangs and plays freely by two diagonal ſupporters B B, a trigger fixed to this bar bears againſt a catch-wheel: this, being fixed on the axle, occaſions a regular and continual motion, or jogging of the ſpouts, quicker or ſlower in proportion to the pace the perſon ſowing with it drives; and of courſe, if he quickens his pace, the bar will receive a greater number of ſtrokes from the catch-wheel, and the grain or ſeed will feed the faſter. If he drives ſlower, by receiving fewer ſtrokes, the contrary muſt take place. In going along the ſide of a hill, the ſtrength of the ſtroke is corrected by a ſpring which acts with more or leſs power, in proportion as the machine is more or leſs from a horizontal poſition, and counteracts the difference of gravity in the bar, ſo that it preſſes, in all ſituations, with a proper force againſt the catch-wheel. This ſpring is unneceſſary if the land be pretty level.

At

At the bottom of the machine, is placed an apron or ſhelf in a ſloping poſition, and the corn or ſeed, by falling thereon from the ſpouts above, is ſcattered about in every direction under the machine, and covers the ground in a moſt regular and uniform manner.

To ſow the corn or ſeed in drills, there are moveable ſpouts, (ſee Fig. 10.) which are fixed on, or taken off at pleaſure, to direct the ſeed from the upper ſpout to the bottom of the furrow.

The machine is regulated for ſowing any particular quantity of ſeed on an acre, by a braſs ſlider, A, fig. 7, fixed by ſcrews againſt a braſs bridge on each of the ſpouts. The machine is prevented from ſeeding while turning at the ends, by only removing the lever E, Fig. 2, out of the channel G, to another at H, on the right hand of it, which carries back the bar from the catch-wheel, and occaſions the motion of the ſpouts to ceaſe, and at the ſame time brings them upon a level, by the action of the diagonal ſupporters; ſo that no corn or ſeed can fall from them.

The machine in this form is particularly uſeful for broadcaſting clover upon barley or wheat; or for ſowing any other kind of ſeed, where it is neceſſary that the land ſhould firſt be harrowed exceedingly fine and even.

Manner of uſing the Machine, when drawn by a Horſe.

PLACE the machine about two feet from the ends of the furrows where you intend it ſhall begin to ſow. Fill the hoppers with ſeed, and drive it forward with the outſide wheel in the firſt furrow. When you are at the end of the length, at the oppoſite ſide of the field, lift the lever E, Fig. 2, into the channel H, and the machine will inſtantly ſtop ſowing. Drive it on about two feet, and then turn. Fill the hoppers again if neceſſary; then remove the lever back again into the channel G, and in returning, let the outſide wheel of the machine go one furrow within the track which was made by it, in paſſing from the oppoſite end: As for example, if the wheel paſſed down the eighth furrow from the outſide of the field, let it return in the ſeventh;

ſeventh; and in every following length let the outſide wheel always run one furrow within the track made by the ſame wheel; becauſe the breadth ſown is about nine inches leſs than the diſtance between the wheels.

Let the machine be kept in a perpendicular ſituation. If the farmer wiſhes to ſow more or leſs ſeed on any one part of the field than the other, it is only raiſing the handles a little higher, or ſinking them a little lower than uſual, and it will occaſion a ſufficient alteration; and ſhould the laſt turn be leſs in breadth than the machine, thoſe ſpouts which are not wanted, may be taken up from the bar, and prevented from feeding, by turning the knob above them.

Alſo, when the land required to be ſown has what is called a vent, that is, when the ſides of the field run in an oblique line to the furrows, which by this means are unequal in length; the ſpouts muſt be taken up or let down in ſucceſſion by turning the knobs; as that part of the machine, where they are placed, arrives at the ends of the furrows. This is done while the machine is going forward.

If the land be tolerably level, the machine may be fixed by the ſcrew in the front, and may then be uſed by any common harrow-boy.

Method of regulating the Machine.

IN each ſpout is fixed a bridge, ſee Fig. 7, with an aperture in it, B, for the grain or ſeed to paſs through. This aperture is enlarged or contracted by a ſlider, A, which paſſes over it; and when properly fixed for the quantity of ſeed deſigned to be ſown on an acre, is faſtened by means of two ſtrong ſcrews, firmly againſt the bridge. This is made uſe of in ſowing all kinds of ſeed, where it is required to ſow from one buſhel upwards on an acre. To ſow one, two, three gallons, or any of the intermediate quantities, as of clover, cole-ſeed, &c. the braſs plate, fig. 6, is placed between the bridge and the ſlider, with the largeſt aperture

ture B downwards, which aperture is enlarged or contracted by the ſlider as before. To ſow turnips, the ſame plate is placed between the bridge and the ſlider, with its ſmalleſt aperture A downwards, and the hollow part about the ſame aperture inwards.

Fig. 8, is a view of the regulator, by which the apertures in the ſeveral ſpouts are all ſet exactly alike, with the utmoſt eaſe, to make them ſeed equally. The extreme height of the largeſt aperture is equal to the breadth A B, and the breadth at C is equal to the height of the ſmalleſt aperture uſed, viz. that for turnips. The ſide A C, is divided into 60 equal parts, and on it moves the ſlider or horſe D; which being placed at any particular degree, according to the quantity of ſeed required to be ſown on an acre, is fixed upon it, by a ſcrew on the ſide of the ſlider or horſe. When this is done, the end of the regulator is put through the aperture in the bridge or plate (whichever is intended to be uſed) and the ſlider againſt the bridge in the ſpout raiſed by it, till it ſtops againſt the horſe on the regulator; then the ſlider is faſtened againſt the bridge firmly by the two ſcrews; care being taken at the ſame time, that it ſtands nearly ſquare.

By this means the ſpouts (being all fixed in the ſame manner) will ſeed equally.

It is eaſy to conceive that the ſize of the apertures, and conſequently the quantity of ſeed to be ſown on an acre, may be regulated with a far greater accuracy than is required in common practice.

The ſpouts may be regulated with the utmoſt nicety, in five minutes, to ſow each particular ſeed, for the whole ſeaſon. But a little practice will enable any perſon, who poſſeſſes but a very moderate capacity, to make the ſpouts ſeed equally, even without uſing the regulator.*

* Proper directions are given with each machine for uſing it, as alſo for fixing the ſliders to ſow any particular quantity of corn or ſeed on an acre: ſo as to enable any perſon to ſet the ſpouts.

Of

Of the Machine, when made to be uſed by Hand.

THE difference of the machine in this caſe is, that it is made lighter, with but three ſpouts, without ſhafts, and is driven forward by the handles. It hath alſo a bolt in front, which being puſhed in by the thumb, releaſes the machine: ſo that it can then eaſily be placed in a perpendicular poſition. This alteration is neceſſary to keep the handles of a convenient height, in ſowing up and down a hill, where the ſlope is conſiderable; and is done while the machine is turning at the end of the length. —The method of regulating and uſing it, is the ſame as when made to be drawn by a horſe.

Of the Machine, when conſtructed to be uſed with a Plough.

THIS is, without doubt, the moſt uſeful application of the machine: and it can be fixed without difficulty to any kind of plough, in the ſame manner as to that repreſented in Plate I.

The advantages ariſing from the uſe of it are great and numerous; for, beſide the increaſe in the crop, which will be inſured by the ſeeds being broad-caſt with a mathematical nicety; a large portion of ſeed, (the value of which alone, in a few months, will amount to more than the price of the machine) and the ſeedſman's labour, will be ſaved. The ſeed may likewiſe be ſown either under, or over furrow; or one caſt each way, as is practiſed by ſome farmers. The ſeed alſo, being caſt by the machine upon the freſh ploughed land, may be immediately harrowed in, before the mould has loſt any part of its moiſture; which in a dry ſeaſon will greatly promote the crop. In drilling any kind of grain, pulſe, or ſeed, it poſſeſſes every property that can be wiſhed for in the beſt drill-plough, nor will it (as moſt of them do) bruiſe the ſeed, or ſeed irregularly. The conſtruction of the machine is the ſame as the large ones, except being made with one hopper and ſpout inſtead of ſeveral, and the apron moveable inſtead of being fixed, as may be ſeen by inſpecting Fig. 4.* The only alteration neceſſary, to make the machine

* See alſo the References.

broad-caſt,

broad-caſt, or drill, is, in the former caſe to place the Apron B, Fig. 1, at the bottom of the machine, on the hooks FF, ſloping, either towards the furrows, or the imploughed land, according as it is intended to ſow the ſeed, either over or under furrow.*

To prepare it for drilling, inſtead of the apron, place the long ſpout, Fig. 10, upon the brackets, on the front of the machine, by the ears A A, to receive the ſeed from the upper ſpout, and faſten the lower end of it, by a ſmall cord, to that hook upon which the apron is hung for broad-caſting, which is next the plough, ſee Fig. 3; the ſeed will then be directed by the long ſpout, to the center of the furrow, near the heel of the plough. The ſpring for correcting the ſtrength of the ſtroke, is neceſſary only when they are required to go along the ſide of a conſiderable declivity. The machine, when fixed to a plough, does not require the ſmalleſt degree of ſkill in uſing, as nothing is neceſſary but to keep the hopper filled.† The accuracy with which it will broad-caſt, may in ſome meaſure be conceived, by conſidering that the ſeed regularly deſcends upon the apron or ſhelf, and is from thence ſcattered upon the ground, in quantity exactly proportioned to the ſpeed of the plough: alſo that each caſt ſpreads to the third furrow; and by this means ſhuts upon the laſt. In this manner it is continually filling up, till the whole field is compleatly covered: ſo that it is impoſſible to leave the ſmalleſt ſpace without its proper quantity of ſeed.

When the plough is wanted for any other purpoſe, the machine, with the wheel at the heel of the plough for giving it motion, can be removed or replaced, at any time in five minutes.

PLATE II. repreſents the machine fixed to a double-furrow creaſing plough, and prepared for drilling. As this plough may not be generally known, it will not be improper to obſerve, that it is chiefly uſed for creaſing the land with furrows, (after it has been once ploughed and harrowed) which method is neceſſary,

* Whenever the apron is required to be ſhifted, it is done in leſs than a ſecond of time; as it only requires to be moved up or down, with the hand, when a catch fixes it.

† The hopper will contain a ſufficient quantity of ſeed to go upwards of 140 rods, before it will want refilling, when three buſhels and a half are ſown on an acre.

when

when the ſeed is to be ſown broaſt-caſt upon land that has been a clover-lay, &c. becauſe, if the ſeed be thrown upon the rough furrows, a conſiderable part of it will fall between them, and be unavoidably loſt, by lying too deep buried in the earth. This mode anſwers extremely well, and partakes of both methods of culture; the ſeed, tho' ſown broadcaſt, falling chiefly into the furrows.

The machine is very uſeful for ſowing in this manner; as the ſeed is broad-caſt, with an inconceivable regularity, at the time the land is creaſed. The advantages it likewiſe poſſeſſes for drilling all ſorts of grain or ſeed with this plough, are too evident to need mentioning.

The machine, when conſtructed to be uſed with a double-furrow plough, is made with two upper and two long ſpouts for drilling, two aprons for broad-caſting, and with a double hopper, but in other reſpects the ſame as when intended for a ſingle furrow plough: it is uſed, in all caſes, with the greateſt eaſe imaginable.

The interval between the points of the two ſhares of a creaſing plough is uſually ten inches; the beam about nine feet long; and the whole made of a light conſtruction.

It is perhaps neceſſary to remark, that with the uſe of the machine, no new theoretical ſyſtem of huſbandry is intended to be introduced; the uſe of it is recommended, to aſſiſt the farmer in the practical part of his buſineſs only, and to enable him to make his land produce the largeſt crops poſſible, with the leaſt expence, whatever be the mode of culture he chuſes to follow. The machine is in every reſpect calculated for common uſe; it is very durable, and cannot without great violence be put out of order. The principles upon which it acts are likewiſe extremely ſimple, and no way depending upon nice mechaniſm.

REFERENCES

REFERENCES TO PLATE I.

FIGURE I.

The machine fixed to a Kentiſh turn-reſt plough.

B. The apron, upon which the ſeed falls and rebounds upon the land, in broadcaſting.

C. Lid to cover the hopper.

D. Wheel at the heel of the plough.

E. Strap.

FF. Hooks, upon which the apron turns by a pivot on each ſide.

G. Stay, to keep the machine ſteady.

H. Lever, to prevent it from ſowing.

FIGURE III.

The machine conſtructed to be drawn by a horſe.

A A A A. The hoppers.

B B. The diagonal ſupporters.

C C C C. The upper ſpouts.

D. The apron or ſhelf upon which the ſeed falls from the upper [ſpouts.

E. The lever, which carries back the bar, and prevents the machine from ſowing.

F F. Staples upon the handles, through which the reigns paſs, for the man who conducts the machine to direct the horſe by.

I. Screw, to fix the machine occaſionally.

☞ The knobs (by turning which each particular ſpout may be taken from off the bar, and thereby prevented from feeding) are over each upper ſpout, but (to prevent confuſion) are not lettered in the plate.

FIGURE III.

Is the ſame machine with that in FIG. I. The dotted lines expreſſing the ſituation of the long ſpout, when the apron is removed, and the machine adapted for drilling.

FIGURE IV.

Same machine, front laid open to ſhew the inſide.

A. The catch-wheel fixed upon the axle.

B B. The axle, upon which the machine hangs between the handles of the plough.

C. The pulley, by which the ſtrap from the wheel at the heel of the plough turns the catch-wheel.

D. The bar, upon which the upper ſpout reſts, ſuſpended by the diagonal ſupporters E E, bearing againſt the catch-wheel by the trigger F, and thereby kept in motion, while the plough is going.

G. The apron in a ſloping poſition, upon which the corn or ſeed falls from the upper ſpout, and is ſcattered by rebounding upon the land. It turns upon pivots, and by this means throws the ſeed either towards the right hand or left at pleaſure.

FIGURE V. The upper ſpouts.

FIGURE VI. The plate, which is placed between the bridge and the ſlider, for ſowing ſmall ſeeds. The aperture A being downwards, for ſowing turnips; the larger one B downwards, for ſowing clover, &c.

FIG. VII. The bridge, fixed in the upper ſpouts.

A. The ſlider, which contracts or enlarges the different apertures.

B. The aperture in the bridge, through which the ſeed paſſes, when ſowing any quantity from one buſhel upwards on an acre.

FIG. VIII. The regulator, made of braſs.

D. The ſlider or horſe which moves upon it, and is fixed at any particular degree by a ſcrew in its ſide.

FIG. IX. repreſents the movement in the machine Fig. II.

A A A A. Cleets, between which the upper ſpouts reſt.

B B. The diagonal ſupporters, by which the bar with the upper ſpouts hang.

C. The catch-wheel.

D D. The axle.

E. The trigger upon the bar, which bears againſt the catch-wheel.

F F. Stays from the back of the machine, by which the bar plays.

FIGURE X. The long ſpout.

A A. The ears by which it hangs.

The

The three following Letters relate to a ſubject of ſo intereſting a nature to the peace and welfare of the community at large, that although they do not come immediately within the plan of our publication, we think no other apology neceſſary for inſerting them.

ARTICLE XXVIII.

An account of the Origin, Progreſs, and Regulations, with a Deſcription of the newly eſtabliſhed Bridewell, or Penitentiary Houſe, at Wymondham, in Norfolk.

LETTER I.

From Sir THOMAS BEEVOR, bart. to the Secretary.

SIR,

ONE avocation in which I have lately been engaged, I will relate to you. Having read Mr. HOWARD's book deſcribing the ſtate and condition of our priſons, it naturally led my thoughts to that ſubject. The idea that *as many priſoners died yearly in England by the gaol diſtemper as by all the executions put together*; and the accounts of the diſſoluteneſs and profligacy, which by the intermixture of them were learnt and practiſed in thoſe places of confinement; determined me to attempt, at leaſt, a reformation of thoſe crying evils in this county.

Happily my wiſhes met the ideas of the other gentlemen acting in the commiſſion of the peace here; and to their great honour, by their unanimous concurrence and aſſiſtance, I have been able to get erected a new Bridewell and Penitentiary-Houſe at Wymondham, built upon ſuch a plan as enables the Governor to keep the ſexes and degrees of offenders entirely ſeparate from each other, and under ſuch regulations and diſcipline, as promiſe (with GOD's bleſſing) to work a thorough reformation in their manners, whereby they may, and many probably will, again become uſeful members of ſociety. The houſe is conſtructed agreeably to the directions of the late act of parliament, and ſo contrived, that there are ſeparate cells for each priſoner, airy, neat, and healthy, in which they ſleep, and, when neceſſary, work the whole day alone. This ſolitude is found to affect the moſt unfeeling and hardened among them beyond fetters or ſtripes; and is that part of their puniſhment from which reformation is chiefly expected. Their cells are all arched, ſo that no fire can reach beyond the cell in which it begins. The rules and orders for the government of the houſe were, at the deſire of the Juſtices at their Quarter Seſſions, drawn up from, and according to the directions of the ſaid act, by myſelf, and have met with their approbation.

Lord

Lord *Loughborough*, who came this circuit at our laſt aſſizes, expreſſed himſelf ſo well pleaſed with the plan and regulations, that he told me he would ſend thither every convict ſentenced to confinement, and accordingly ſent ſix from the aſſizes. As this attention to the lives and morals of thoſe unhappy members of ſociety ſhould be extended, I will by the firſt opportunity (if you deſire it) ſend you a copy of the rules and orders of the houſe, together with the returns conſtantly made by the governor to each quarter-ſeſſions, by which you will ſee effected, what Mr. HOWARD deſpaired of, viz. " that the priſoners' earnings in the houſe have " uniformly exceeded the ſum expended for their " maintenance." I wiſh and hope this example may excite a like attention in other counties.

I am, &c.

Hethel-Hall, Norfolk, THO. BEEVOR.
Dec. 21, 1784.

LETTER II.

SIR, *Hethel, Jan.* 20, 1785.

I Herewith tranſmit you a copy of the rules, orders, and regulations, to be obſerved and enforced at the houſe of correction at Wymondham; and which are alſo now extended to the other

houſes of correction in this county. If they appear ſevere, let it be underſtood they are the ſeverities of the *legiſlature*, not of the compiler. The firſt ſeven rules are inſerted verbatim from the ſchedule to the act of the 22d of his preſent Majeſty. The reſt are either included in the body of the ſame act, or required by the act of the 19th, called *The Penitentiary Act*. But I will make no apology for them, nor can I with any propriety deem them too harſh, ſince they have met with the entire approbation of the gentlemen of this county, as well as that of the judges of the aſſize, who have peruſed them.

Priſons ſurely ſhould be places of real puniſhment, and even carry terror in their name. I am certain they ought not to afford either indulgencies or amuſements to the perſons conſigned to them. However I muſt obſerve, that perſons committed for ſmall offences, or on light ſuſpicion, are under leſs reſtraint. They are allowed to work in ſome ſort of ſociety, two, three, or four together; and if the houſe be full, they ſometimes lodge two in a cell, and are never fettered. All the priſoners, when ſick, are attended by a ſurgeon or apothecary, with as much aſſiduity and tenderneſs as the greateſt humanity can require.

I have

I have ſent you likewiſe a table of the priſoners' fare or diet in the houſe, by which you will ſee, that although not *pampered*, they are *wholſomely* fed. Experience juſtifies me in ſaying this; for, except ſuch as were diſeaſed when they entered the houſe, I have not known one priſoner who has been ſick in it for theſe twelve months paſt. Included is alſo the form of a return made by the keeper of the houſe, to every quarter-ſeſſions of the peace, whereby the ſtate of the priſon is conſtantly known to the juſtices, and all abuſes obviated or ſpeedily remedied. I am, &c.

THOMAS BEEVOR.

Rules, Orders, and Regulations, to be obſerved and enforced at the Houſes of Correction in the county of Norfolk.

I. THAT the ſeveral perſons committed to the houſes of correction, to be kept to hard labour, ſhall be employed (unleſs prevented by ill health) every day (except Sundays, Chriſtmas-day, and Good-Friday) for ſo many hours as the day-light in the different ſeaſons of the year will admit, not exceeding twelve hours, being allowed to reſt half an hour at breakfaſt, an hour at dinner, and half an hour at ſupper, and that the intervals ſhall be noticed by the ringing of a bell.

II. That the governor of each houſe of correction ſhall adapt the various employment directed by the juſtices, at their quarter-ſeſſions, to each perſon, in ſuch manner as ſhall be beſt ſuited to his or her ſtrength and ability, regard being had to age and ſex.

III. That the males and females ſhall be employed, and ſhall eat and be lodged, in ſeparate apartments, and ſhall have no intercourſe or communication with each other.

IV. That

IV. That every perſon ſo committed ſhall be ſuſtained with bread, and any coarſe, but wholeſome food, and water; but perſons under the care of the phyſician, ſurgeon, or apothecary, ſhall have ſuch food and liquor as he ſhall direct.

V. That the governor, and ſuch other perſons (if any) employed by the juſtices to aſſiſt the governor, ſhall be very watchful and attentive in ſeeing that the perſons ſo committed are conſtantly employed, during the hours of work; and if any perſon ſhould be found remiſs or negligent in performing what is required to be done by ſuch perſon, to the beſt of his or her power and ability, or ſhall wilfully waſte, ſpoil, or damage, the goods committed to his or her care, the governor ſhall puniſh every ſuch perſon in the manner hereafter directed.

VI. That if any perſon ſo committed, ſhall refuſe to obey the orders given by the governor, or ſhall be guilty of profane curſing or ſwearing, or of any indecent behaviour or expreſſion, or of any aſſault, quarrel, or abuſive words, to or with any other perſon, he or ſhe ſhall be puniſhed for the ſame in the manner hereafter directed.

VII. That the governor ſhall have power to puniſh the ſeveral offenders, for the offences herein before deſcribed, by cloſer confinement, and ſhall enter in a book (to be kept by him for the inſpection of the juſtices at the quarter-ſeſſions, and the viſiting juſtice or juſtices) the name of every perſon who ſhall be ſo puniſhed, expreſſing the offence, and the duration of the puniſhment inflicted.

VIII. That the governor ſhall prevent all communication between the perſons committed upon charges of felony, or convicted of any theft or larceny, and the other priſoners.

IX. That the governor ſhall employ in ſome work or labour (which is not ſevere) all ſuch priſoners as are kept and maintained by the county, though by the warrant of commitment ſuch priſoner was not ordered to be kept to hard labour; and he ſhall keep a ſeparate account of the work done by priſoners of this deſcription, and ſhall pay half of the nett profits to them on their diſcharge, and not before.

X. That neither the governor, nor any one under him, ſhall ſell any thing uſed in the houſe, nor have any benefit or advantage whatſoever, directly or indirectly, from the ſale of any thing, under the penalty of ten pounds and diſmiſſion from his employment; neither ſhall he ſuffer any wine, ale, ſpirituous or other liquors, to be brought into the houſe, unleſs for a *medical* purpoſe, by a written order from the ſurgeon or apothecary uſually attending there.

XI. That clean ſtraw to lodge upon, ſhall be allowed to each priſoner weekly, or oftner if neceſſary; and that the priſoners be obliged to ſweep out and clean their rooms every day, and the dirt and duſt be conveyed out of the priſon daily.

XII. That no perſon, without permiſſion of a viſiting juſtice, ſhall go into the lodging-rooms, or ſee or converſe with any priſoner committed upon a charge of felony, or convicted of any theft or larceny; and all the priſoners ſhall every night in the year be locked up, and all lights extinguiſhed, at or before the hour of nine, and ſhall, during reſt, be kept entirely ſeparate, if rooms ſufficient can be found for that purpoſe; and during their labour as much ſeparate as their employment will admit of.

XIII. That the governor may put handcuffs or fetters upon any priſoner who is refractory, or ſhews a diſpoſition to break out of priſon, but he ſhall give notice thereof to one of the viſiting juſtices, within 48 hours after the priſoner ſhall be ſo fettered, and he ſhall not continue ſuch fettering longer than ſix days, without an order in writing from one of the viſiting juſtices.

XIV. That every priſoner be obliged to waſh his face and hands once, at leaſt, every day, before his bread be given to him.

XV. That each priſoner be allowed a clean ſhirt once in a week.

XVI. That the three prohibitory clauſes of the 24th Geo. II. chap. 40, be painted on a board, and hung up in ſome conſpicuous part of the priſon, together with a printed copy of theſe rules, orders and regulations.

A Table

A Table of Diet.

	BREAKFAST.	DINNER.
Sunday,	A Penny Loaf	Hanway's Soups of Ox cheek, &c
Monday,	Ditto	A penny loaf
Tueſday,	Ditto	Potatoes
Wedneſday,	Ditto	Boiled peaſe
Thurſday,	Ditto	A penny loaf
Friday,	Ditto	Potatoes
Saturday,	Ditto	Boiled peaſe.

LETTER III.

Deſcription of the Priſon.

SIR, *Hethel, Feb.* 20, 1786.

In compliance with your requeſt, I now tranſmit to you a deſcription of the priſon which has been erected at Wymondham, in this county; the ſucceſs of which having ſo much exceeded the expectations, and ſo fully anſwered the wiſhes, of the gentlemen here, as to encourage them to alter, and make additions to all the other bridewells within their juriſdiction, and to put each of them under the ſame regulations.

The new buildings of the Wymondham bridewell, added to the former old houſe, (which is now appropriated to the uſe of the governor) conſiſt of two wings, which are attached to the old houſe, and

and joined by a building in front, containing a large room, in which is placed a mill for cutting log-wood, or any other wood for the uſe of dyers, and beating hemp; together with a ſtable, and ſtore-rooms for lodging the materials uſed by the priſoners in their work. The whole of theſe buildings forms a quadrangle, incloſing an area or yard, of about eighty feet by ſeventy; in which ſome of the priſoners are allowed occaſionally to take the air.

In the two wings only (to both which there is a paſſage from the governor's houſe) are the offenders confined; and in each of them, there are on the ground floor ſeven ſeparate rooms, or cells, for the *men* priſoners, of fourteen feet eight inches by ſeven feet four inches, with a work-room of twenty feet ſix inches by ten feet.

On the floor above, which is chiefly uſed for the women and leſs dangerous priſoners, are, in each wing, four ſeparate rooms or cells, of the ſame dimenſions with thoſe below; with a work-room to each wing, the ſame as on the ground floor; together with an infirmary of ten feet ſix inches by fourteen feet eight inches, and a ſcullery, cloſet, and neceſſary to each. The cells, both above and below, are all arched, to prevent the poſſibility of fire, or any probable communication of infectious diſorders.

orders. They are all ten feet high; and the windows of theſe rooms, looking into the quadrangle, and being grated inſide and outſide with iron, and ſeven feet high from the floor of the rooms, afford the priſoners no poſſibility of looking out, or having the leaſt intercourſe with any other perſon. The cells are airy, having only wooden ſhutters to the windows; and by a ſlip or wicket in the doors, a thorough air is admitted, whereby they are always free from any ill ſcent. This is however with an exception to *one* cell on the upper floor in each wing, and to the infirmaries; for the windows of theſe are glazed, and have caſements to open occaſionally; being moſtly kept for the uſe of women having infant children with them, and for the weak and convaleſcent priſoners. But as the conſtruction of this building would little anſwer the purpoſe of its erection, without a correſpondent management and conduct in the interior government of it, good care has been taken to enforce the rules, orders, and regulations eſtabliſhed; and returns are regularly made by the governor to the juſtices at every quarter-ſeſſions.

The manufactory eſtabliſhed here at preſent is, that of cutting logwood for the dyers at Norwich, and beating, heckling, and ſpinning hemp. In the labour of heckling, a tolerable workman will earn

earn from eight to ten ſhillings per week. The women and girls ſpin it by a wheel ſo contrived as to draw a thread with each hand; by which means, *two* of them can earn at leaſt equal wages with *three* women ſpinning with one hand only. If the building ſhould be enlarged, and the number of priſoners increaſe, ſome of them will then be inſtructed in the art of weaving the yarn made in the houſe. At preſent, both the tow and the yarn are ſold to the different houſes of induſtry eſtabliſhed in this county, and at Norwich. In the laſt return of the governor to the quarter-ſeſſions, we had the ſatisfaction to find, that the money ariſing from the earnings of the priſoners, was one pound eight ſhillings and ten-pence more than *double* the ſum expended for their maintenance.

This, though it cannot be deemed more than a *ſecondary* conſideration, is ſurely no trifling one to derive a *profit* from the labour of ſuch perſons as were heretofore loſt to, or become a burden upon the publick; and it ſtrongly marks the impolicy of ſending theſe unhappy objects out of the kingdom. This ſum indeed was further increaſed about five guineas, by adding to it the profit from the trade account; but as to have this become the general reſult, muſt depend greatly, perhaps chiefly, upon the choice of the governor, and ſomewhat on the

activity

activity of the magiſtrates, too much care cannot be taken in the former, eſpecially as it will be the probable means of exciting the latter. We have been ſo fortunate as to meet with a governor, who relieves us from a great part of our attention to, and direction of him.

The ſilence and peaceable demeanour, the cleanlineſs and induſtry, of thoſe unhappy perſons who are the inhabitants of this houſe, are really admirable; and ſuch as greatly encourage the pleaſing expectation, that their puniſhment will have that effect upon their future lives and conduct, which every humane, benevolent mind muſt ſincerely wiſh for. And they leave *me* without a doubt, that bridewells, with proper attention paid to them, may in future be made ſeminaries of induſtry and reformation, inſtead of receptacles of idleneſs and corruption. To effect theſe purpoſes, it will be neceſſary to provide the priſoners with ſuitable and conſtant work. This in moſt counties will neceſſarily vary, but may be eaſily obtained, eſpecially if, by an allowance to the governor out of their earnings, it be made his *intereſt* as well as his *duty* to look carefully to the performance of it. The allowance given at this houſe, is *three-pence* in every ſhilling of the *nett* earning, and this is conſidered as a part of his ſalary.

I muſt

I muſt not omit to inform you, that in this ſolitary confinement, and thus employed, it has not yet been found neceſſary to puniſh any of the priſoners with irons; and that, ſince the new erection and regulation of this priſon, the magiſtrates in the vicinity, as well as the keeper of it, have obſerved, that in no one equal period of time have there been ſo few commitments to it.

This *preventive* juſtice, ſo preferable to *punitive* juſtice, moſt fully evinces the propriety and humanity of the undertaking, and muſt naturally excite a hope, that ſimilar plans will be adopted in every county. This indeed I am ſtrongly induced to believe will ſoon be the caſe, as I have already received letters from different gentlemen in Gloceſterſhire, Oxfordſhire, Wilts, Hertfordſhire, Hampſhire, Yorkſhire, Lancaſhire, Suffolk, Wales, and Scotland, requeſting the plan, rules, orders, table of diet, and returns; informing me, that in their reſpective counties they had determined upon building, and putting their houſes of correction under ſimilar regulations.

The gentlemen of the city of Norwich have alſo ſent a deputation of their magiſtrates to view the priſon; upon whoſe report, they mean inſtantly to enter upon a reformation of their own priſons.

If

If in this letter I may appear to have been either prolix, or frivolous, but ſhould notwithſtanding have been able to convey any uſeful hints to the publick, I ſhall be ſatisfied in having ſacrificed the reputation of ability at the ſhrine of duty, and with pleaſure ſubſcribe myſelf, &c.

THOMAS BEEVOR.

[N. B. In another letter dated Feb. 18th, Sir THOMAS BEEVOR has added the following remarks:

"In proof of the cleanlineſs and healthineſs of this priſon, no perſon who entered it in health has hitherto fallen ſick in it. I have never had any complaint againſt any one for immorality or prophaneneſs. The effect of the ſolitarineſs, and mechanical regularity of the place, is ſuch, as to render them ſo contrite and ſubdued, that it not only promiſes fair for a laſting reformation in theſe poor unfortunate wretches, but, what is a ſtill better and more pleaſing conſideration, that it may prove a preventive of crimes in others. For, from an examination of the commitments to this houſe, before, and ſince the preſent regulation took place, it appears, that one-third fewer have been confined in it ſince the latter period; and it is ſomewhat remarkable, that, except in one inſtance, no priſoner has been a ſecond time committed to it."]

Article XXIX.

On ſetting Wheat.

[In a Letter to the Secretary.]

Sir,

YOU tell me, in your laſt letter, that ſome gentlemen of your Society ſtill doubt whether the practice of *ſetting* wheat becomes more general in Norfolk; and that their doubts ariſe from an apprehenſion that, on a large ſcale, a ſufficient number of hands could not be procured to do it.

In reply to thoſe gentlemen, I can not only ſay in general, that regular and profitable employment *always creates workmen*, but that in *this* particular labour, in which *women* as well as men can and *do* dibble, and *children* chiefly drop the grain, we have not yet met with any difficulty on that head; and that the practice increaſes much in this neighbourhood, as I believe it likewiſe does in moſt parts of the county.

At the ſame time candour obliges me to obſerve, that my habitation is in a very populous part of the country, where a ſcarcity of labourers is rarely known; yet I think the profit gained by the wheat-ſetters is ſuch, that, in almoſt every ſituation, it will draw people enough to that employment.

For inſtance, the price frequently given (although I never pay more than eight ſhillings) is ten ſhillings per acre.* This in good weather may be done by one dibbler, attended by three droppers, in two days. This is five ſhillings per day, of which, if the dibbler gives to the children ſixpence each, he will have himſelf 3s. 6d. for his day's work, which is much more than he can poſſibly earn by any other labour ſo eaſy to himſelf. But put the caſe, that the man has a wife who dibbles with him, and two or three of his own children to drop to him, you ſee his gains will then be prodigious, and enough to inſure a plenty of candidates for that work, even in the leaſt populous parts of the country.

When I ſay the practice of *ſetting* wheat in this county is become more general, I would not be underſtood that it is practiſed to the entire excluſion of ſowing broadcaſt. Improvements in agriculture are ſlow in their progreſſion. Since the firſt introduction of turnips, and I believe it alſo of clover, the culture of them did not for many years extend from the places of their firſt trial more than in the proportion of one mile in a year. The *ſetting* wheat you know is of a modern date; and this laſt ſeaſon was late in conſequence of the backwardneſs

* Although it is now done for ſix ſhillings an acre, the labourers earnings, from their expertneſs in the buſineſs, is very nearly, if not quite, equal to what is here ſtated.

of

of the harveſt; it was alſo very wet and cold, which prevented many people from *ſetting* the quantity they had propoſed; and obliged them, at the latter end of ſeed time, to ſow broadcaſt on that account.

As I have no wiſh to ſupport any ſyſtem, I would not attempt to recommend any practice which did not appear to me a beneficial one. Wheat-ſetting certainly is ſo, eſpecially when corn is dear; and if the ſeaſon be favourable, may be practiſed with great benefit to the farmer.

On clover and graſs leys, and ground not free from weeds, it is attended with peculiar advantages, from the wheat being depoſited in the middle of the flag, free from the graſs and weeds which ſpring from the edges, and frequently envelope and choke it, and alſo from ſuch of them as would ſpring up and flouriſh, were the flag broken and torn in pieces by the harrows.

From my own experience, I find the produce is two buſhels per acre more than from the wheat which is ſown; but having much leſs ſmall corn intermixed with it, the ſample is better, and always fetches a higher price, to the amount generally of *two ſhillings* per quarter. Add to this, the great ſupport given to the poor by this *ſecond* harveſt (as I may call it) which enables them to diſcharge their

rents, and maintain their families,* without having recourſe to the pariſh; and I think the benefit muſt be obvious to every perſon.

I am, &c.

Hethel-Hall, Norfolk,
Jan. 29, 1785.

THO. BEEVOR.

ARTICLE XXX.

References to the annexed Plate of a patent Drill-Machine, invented by the Rev. JAMES COOKE, *of Heaton-Norris, near Manchester;*† *and of a new-conſtructed ſimple Hand-Hoe.*

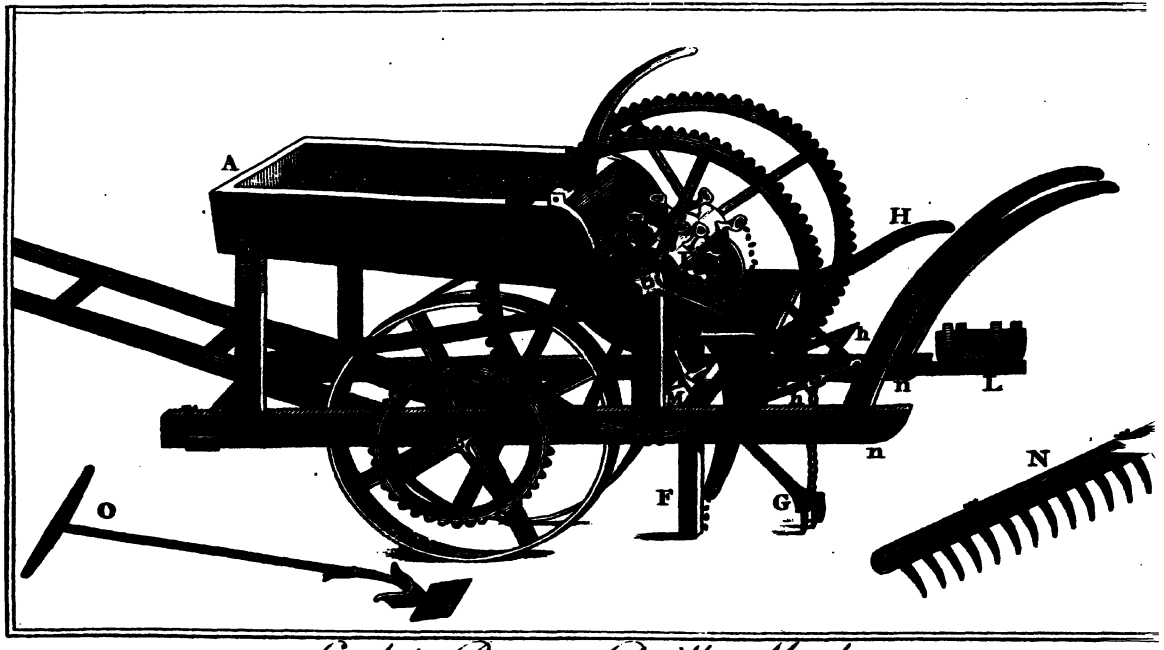
A, the upper part of the ſeed-box.

B, the lower part of the ſame box.

C, a moveable partition, with a lever, by which the grain or ſeed is let fall at pleaſure from the upper to the lower part of the ſeed-box, from whence it is taken up by cups or ladles applied to the cylinder D, and dropped into the funnel E, and conveyed thereby into the furrow or drill, made in the land by the coulter F, and covered by the rake or harrow G.

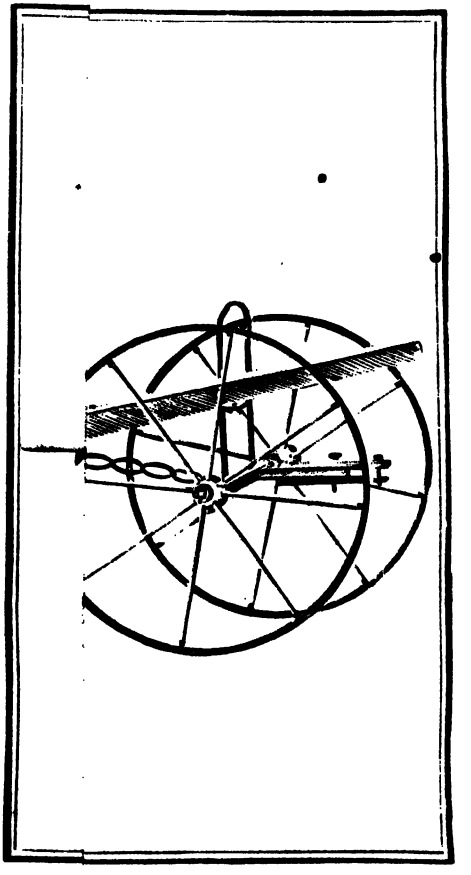
* Excluſive of the advantage farmers would reap from adopting a practice ſo fully and deciſively proved to be right, we cannot but ſtrongly recommend this conſideration to their notice. In many parts of the Weſt, where the poor are numerous, and employment not plentiful, the ſetting of wheat would be of infinite ſervice both to them and the farmers.

† Now at No. 73, Oxford-ſtreet, London.



Cooke's Patent Drill Machine.

Pl. I



H, a lever, by which the wheel I is lifted out of generation with the wheel K, to prevent the grain or ſeed being ſcattered upon the ground, while the machine is turning round at the end of the land, by which the harrow G is alſo lifted from the ground at the ſame time, and by the ſame motion, by means of the crank, and the horizontal lever *h h*.

L, a ſliding lever, with a weight upon it, by means of which, the depth of the furrows or drills, and conſequently the depth that the grain or ſeed will be depoſited in the land, may be eaſily aſcertained.

M, a ſcrew in the coulter-beam, by turning o which, the ſeed-box B is elevated or depreſſed, in order to prevent the grain or ſeed being cruſhed or bruiſed by the revolution of the cups or ladles.

N, a rake with iron teeth, to be applied to the underſide of the rails of the machine, with ſtaples and ſcrew nuts at *n n*, by which many uſeful purpoſes are anſwered, viz. in accumulating cuitch or hay into rows, and as a ſcarificator for young crops of wheat in the ſpring, or to be uſed upon a fallow; in which caſe, the ſeed-box, the ladle cylinder, the coulters, the funnels, and harrows, are all taken away.

O, is a new-conſtructed ſimple Hand-Hoe, by which one man will effectually hoe two chain acres per day, earthing up the ſoil at the ſame time to the rows of corn or pulſe, ſo as to cauſe roots to iſſue from the firſt joint of the ſtem, above the ſurface of the land, which otherwiſe would never have exiſted.

This ſide view of the machine is repreſented, for the ſake of perſpicuity, with one ſeed-box only, one coulter, one funnel, one harrow, &c. whereas a complete machine is furniſhed with five coulters, five harrows, ſeven funnels, a ſeed-box in eight partitions, &c. with ladles, of different ſizes, for different ſorts of grain and ſeeds.

Theſe machines (with five coulters price ſixteen guineas; with four coulters, fifteen guineas) equally excel in ſetting or planting all ſorts of grain and ſeeds, even carrot ſeed, to exactneſs, after the rate of from eight to ten chain acres per day, with one man, a boy, and two horſes. They depoſit the grain or ſeed in any given quantity from one peck to three buſhels per acre, regularly and uniformly, and that without grinding or bruiſing the ſeed, and at any given depth, from half an inch to half a dozen inches, in rows at the diſtance of twelve, ſixteen, and twenty-four inches, or any other diſtance. They are equally uſeful on all lands, are durable, eaſy to manage, and by no means ſubject to be put out of repair.

Models may be ſeen at the White-Bear, Baſinghall-ſtreet; at Mr. GATFIELD's, No. 54, Newgate-ſtreet, London; and at Mr. MATTHEWS's, Bath.

[N. B. If the patentee makes good his aſſertion the approaching ſeaſon, "that this kingdom will be benefited by the above ſyſtem of agriculture, ſuppoſing it in general uſe, from twenty to thirty millions ſterling per annum," it muſt appear ſelf-evident to every one, that this nation will ſtand in need of no other reſource!]

Directions

Directions for uſing the Machine.

The ladle cylinder D (ſee the plate) is furniſhed with cups or ladles of four different ſizes for different ſorts of grain or ſeeds, which may be diſtinguiſhed by the numbers 1, 2, 3, 4.

No. 1, (the ſmalleſt ſize) is calculated for turnip-ſeed, clover-ſeed, cole-ſeed, rape, &c. and will ſow ſomething more than one pound per ſtatute acre.

No. 2, for wheat, rye, hemp, flax, &c. and will ſow ſomething more than one buſhel per acre.

No. 3, for barley; and will ſow one buſhel and a half per acre.

No. 4, for beans, oats, peaſe, vetches, &c. and will ſow two buſhels per acre.

Notwithſtanding the above ſpecified quantities of grain or ſeeds, a greater or leſs quantity of each may be ſown at pleaſure, by ſtopping up with a little clay, or by adding a few ladles to each reſpective box. The grain or ſeed intended to be ſown, muſt be put in thoſe boxes, to which the cups or ladles as above deſcribed reſpectively belong, an equal quantity into each box, and all the other boxes empty. The ladle cylinder may be reverſed, or turned end for end at pleaſure, for different ſorts of grain, &c.

For ſowing beans, oats, peaſe, &c. with a five-coulter machine, four large ladles muſt occaſionally be applied at equal diſtances round thoſe parts of the cylinder which ſubtend

ſubtend the two end boxes. And for ſowing barley, eight large ones muſt be applied as above; or four ladles, No. 2, to each of the wheat boxes. Theſe additional ladles are fixed on the cylinder with nails, or taken off in a few minutes; but for ſowing with a four-coulter machine, the above alterations are not neceſſary.

The funnels are applied to their reſpective places by correſponding numbers. Care ſhould be taken, that the points of the funnels ſtand directly behind the backs of the coulters, which is done by wedges being applied to one ſide or other of the coulters, at the time they are fixed in their reſpective places.

The machine being thus put together, [ſee the plate] which is readily and expeditiouſly done, as no ſeparte part will coincide with any other but that to which it reſpectively belongs, and an equal quantity of grain or ſeed in each of the reſpective boxes, the land alſo being previouſly ploughed and harrowed once or ſo in a place to level the ſurface; but if the land be very rough, a roller will beſt anſwer that purpoſe, whenever the land is dry enough to admit of it; and upon ſtrong clays, a ſpiked roller is ſometimes neceſſary to reduce the ſize of the large dry clods; which being done, the driver ſhould walk down the furrow or edge of the land, and having hold of the laſt horſe's head with his hand, he will readily keep him in ſuch a direction, as will bring the outſide coulter of the machine within three or four inches of the edge of the land or ridge, at which uniform extent, he ſhould keep his arm till he comes to the end of the land; where having turned round, he muſt come to the other ſide of his horſes, and walking

walking upon the laſt outſide drill, having hold of the horſes head with his hand as before, he will readily keep the machine in ſuch a direction, as will ſtrike the ſucceeding drill at ſuch a diſtance from the laſt outſide one, or that he walks upon, as the coulters are diſtant from each other.

The perſon that attends the machine ſhould put down the lever H, ſoon enough at the end of the land, that the cups or ladles may have time to fill, before he begins to ſow; and at the end of the land, he muſt apply his right hand to the middle of the rail between the handles, by which he will keep the coulters in the ground, while he is lifting up the lever H with his left hand, to prevent the grain being ſcattered upon the headland, while the machine is turning round; this he will do with great eaſe, by continuing his right hand upon the rail between the handles, and applying his left arm under the left handle, in order to lift the coulters out of the ground, while the machine is turning round.

If there be any difficulty in uſing the machine, it conſiſts in driving it ſtraight. As to the perſon that attends the machine, he cannot poſſibly commit any errors, except ſuch as are wilful, particularly as he ſees at one view the whole proceſs of the buſineſs, viz. that the coulters make the drills of a proper depth; that the funnels continue open to convey the grain or ſeed into the drills; that the rakes or harrows cover the grain ſufficiently; and when ſeed is wanting in the lower boxes B, which he cannot avoid ſeeing, he readily ſupplies them from the upper boxes A, by applying his hand, as the machine goes along,

to

to the lever C. The lower boxes B, ſhould not be ſuffered to become empty before they are ſupplied with ſeed, but ſhould be kept nearly full, or within an inch or ſo of the edge of the box.

If chalk lines are made acroſs the backs of the coulters, at ſuch a diſtance from the ends as the ſeed ſhould be depoſited in the ground, (viz. about two inches for wheat, and from two to three for ſpring corn) the perſon that attends the machine will be better able to aſcertain the depth the ſeed ſhould be depoſited in the drills, by obſerving, as the machine goes along, whether the chalk lines are above or below the ſurface of the land; if above, a proper weight muſt be applied to the lever L, which will force the coulters into the ground; if below, the lever L and weight muſt be reverſed, which will prevent their ſinking too deep.

Wheat that is brined and limed ſhould be made dry by ſpreading it thin upon a floor, and the looſe particles of lime ſifted out, before it is ſown by the machine, otherwiſe the grain, by clogging together, will not be ſo regularly diſtributed in the drills. Good old ſeed-wheat is much better than new, and is not ſo ſubject to ſmut; this is proved by experience.

Upon wet ſoils or ſtrong clays, wheat ſhould not be depoſited more than two inches deep, on any account whatever; nor leſs than two inches deep on dry ſoils. From two to three inches is a medium depth for all ſpring corn. But the exact depth at which grain ſhould be depoſited in different

different ſoils, from the lighteſt ſand to the ſtrongeſt clay, is readily aſcertained only by obſerving at what diſtance, under the ſurface of the land, the ſecondary or coronal roots are formed in the ſpring.

In different parts of the kingdom, lands or ridges are of different ſizes; where the machine is too wide for the land, one or more funnels may occaſionally be ſtopped with a little looſe paper, and the ſeed received into ſuch funnel returned at the end of the land, or ſooner if required, into the upper ſeed-box. But for regularity and expedition, lands conſiſting of ſo many feet wide from outſide to outſide, as the machine contains coulters, when fixed at twelve inches diſtance, or twice or three times the number, &c. are beſt calculated for the machine. In wet ſoils or ſtrong clays, lands or ridges of the width of the machine, and in dry ſoils, of twice the width, are recommended. For ſowing of narrow high-ridged lands, the outſide coulters ſhould be let down, and the middle ones raiſed, ſo that the points of the coulters may form the ſame curve, that the land or ridge forms. And the looſe ſoil harrowed down into the furrows ſhould be returned to the edges of the lands or ridges, from whence it came, by a double mould-board, or other plough, whether the land be wet or dry.

Clover or other lays, intended to be ſown by the machine, ſhould be ploughed a deep ſtrong furrow, and well harrowed, in order to level the ſurface, and to get as much looſe ſoil as poſſible for the coulters to work in; and when ſown, if any of the ſeed appears in the drills uncovered, by reaſon of the ſtiff texture of the ſoil, or toughneſs

toughneſs of the roots, a light harrow may be taken over the land, once in a place, which will effectually cover the ſeed, without diſplacing it at all in the drills. For ſowing clays, a conſiderable weight muſt be applied to the lever L, to force the coulters into the ground; and a ſet of wrought-iron coulters, well ſteeled, and made ſharp at the front edge and bottom, are recommended; they will pervade the ſoil more readily, conſequently require leſs draught, and expedite buſineſs more than adequate to the additional expence.

For every half acre of land intended to be ſown by the machine with the ſeed of that very valuable root, (carrot) one buſhel of ſaw-duſt, and one pound of carrot ſeed, ſhould be provided; the ſaw-duſt ſhould be made dry, and ſifted to take out all the lumps and chips, and divided into eight equal parts or heaps; the carrot-ſeed ſhould likewiſe be dried, and well rubbed between the hands, to take off the beards, ſo that it will ſeparate readily, and being divided into eight equal parts or heaps, one part of the carrot-ſeed muſt be well mixed with one part of the ſaw-duſt, and ſo on, till all the parts of carrot-ſeed and ſaw-duſt are well mixed and incorporated together, in which ſtate it may be ſown very regularly in drills at twelve inches diſtance, by the cups or ladles, No. 2. Carrot-ſeed reſembling ſaw-duſt very much in its ſize, roughneſs, weight, adheſion, &c. will remain mixed as above during the ſowing; a ladle full of ſaw-duſt will, upon an average, contain three or four carrot-ſeeds, by which means the carrot-ſeed cannot be otherwiſe than regular in the drills. In attempting to depoſit ſmall ſeeds near the ſurface, it may ſo happen that ſome of the ſeeds may not be covered with

with ſoil; in which caſe, a light roller may be drawn over the land, after the ſeed is ſown, which will not only cover the ſeeds, but will alſo, by levelling the ſurface, prepare the land for an earlier hoeing than could otherwiſe have taken place.

It has always been found troubleſome, ſometimes impracticable, to ſow any kind of grain or ſeed (even broadcaſt) in a high wind. This inconvenience is entirely obviated, by placing a ſcreen of any kind of cloth, or a ſack, ſupported by two uprights nailed to the ſides of the machine, behind the funnels, which will prevent the grain or ſeed being blown out of its direction in falling from the ladles into the funnels. Small pipes of tin may alſo be put on to the ends of the funnels, to convey the grain or ſeed ſo near the ſurface of the land, that the higheſt wind ſhall not be able to interrupt its deſcent into the drills.

That farmers may not be reduced to the neceſſity of ſowing their land out of condition, that is, when the ſoil is wet and clammy, every exertion ought to be made, in ploughing up their lands ready to ſow as early as poſſible in the ſeaſon, that the firſt opportunity of ſowing when the land is dry may be embraced; nothing bids fairer for ſucceſs in the drill ſyſtem, than early ſowing; in which caſe the plants have time to throw out or multiply ſo many additional ſtems or offsets as the land is able to ſupport. But if farmers will ſow early, they muſt plough early, otherwiſe ſtrong productive ſoils will not be in condition to receive the ſeed; and ſuch extraordinary advantages have been uniformly derived from ploughing up ſtubbles immediately after the crops have been carried, that many intelligent,

intelligent, experimental farmers have declared, that one furrow of the plough before winter is worth two or three in the ſpring.

Reſpecting the uſe of the machine, it is frequently remarked, by ſome people not converſant with the properties of matter and motion, that the ſoil will cloſe after the coulters, before the ſeed is admitted into the drills. Whereas the very contrary is the caſe; for the velocity of the coulters, in paſſing through the ſoil, is ſo much greater than the velocity with which the ſoil cloſes up the drills by its own ſpontaneous gravity, that the inciſions or drills will be conſtantly open for three or four inches behind the coulters; by which means it is morally impoſſible (if the points of the funnels ſtand directly behind the coulters) that the ſeed, with the velocity it acquires in falling through the funnels, ſhall not be admitted into the drills.

Directions for Hoeing, &c.

THIS hoe [ſee the plate] is worked much in the ſame manner as a common Dutch hoe, or ſcuffle, is worked in gardens; the handle is elevated or depreſſed, to ſuit the ſize of the perſon that works it, by means of an iron wedge being reſpectively applied to the upper or under ſide of the handle that goes into the ſocket of the hoe.

Wheat and rye cannot be hoed too early in the ſpring, provided the ſoil be dry enough to admit of being previouſly rolled with a light roller; nothing facilitates and expedites hoeing for the firſt time ſo much as rolling, by pulverizing the ſoil and levelling the ſurface; it ought nevertheleſs to be omitted, rather than uſed, if the ſoil be not quite dry, at leaſt dry enough to quit the roller.

The

The wings or moulding plates of the hoe, which are calculated to earth up the ſoil to the rows of corn, ſo as to cauſe the roots to iſſue from the firſt joint of the ſtem above the ſurface, which otherwiſe would not have exiſted, ſhould never be uſed for the firſt hoeing, but ſhould always be uſed for the laſt hoeing, and uſed or not uſed, at the option of the farmer, when any intermediate hoeing is performed. The laſt hoeing or earthing up ſhould not take place till the crop is eight or ten inches high; or till the young ears of corn are ſo far advanced in the ſtems, as to be above the ſurface of the ſoil, when the earthing up is finiſhed. The young ears of corn will, on diſſecting a few ſtems, be found to exiſt in embryo as it were, much ſooner than is generally apprehended. The abſurdity of rolling any crop after the young ears are formed, and of earthing up the ſoil, before they are advanced in the ſtems above the ſurface of the ſoil, muſt be ſelf-evident. In the former inſtance they will be cruſhed by the roller; in the latter, they will be ſmothered by the ſoil. The young ears of corn will be found to exiſt, as ſoon as the ſecondary or coronal roots are formed.

The above obſervations on hoeing wheat and rye, are applicable to the hoeing of all ſpring crops; only the firſt hoeing of barley, oats, &c. ſhould take place as ſoon as the ſecond blade or leaf of the young plant appears; and of beans, peaſe, &c. as ſoon as the plants can be diſtinguiſhed in the rows.

The beſt ſeaſon for hoeing is two or three days after rain, or ſo ſoon after rain as the ſoil will quit the inſtrument in hoeing. Light dry ſoils may be hoed almoſt at any

any time, but this is far from being the caſe with ſtrong clay ſoils; the ſeaſon for hoeing ſuch is frequently ſhort and precarious; every opportunity therefore ſhould be carefully watched, and eagerly embraced. The two extremes of wet and dry are great enemies of vegetation in ſtrong clay ſoils; the bad effects of the former, though difficult to guard againſt, are nevertheleſs to be remedied in ſome meaſure by ploughs of a better conſtruction, and more properly conducted, than ſuch as are commonly met with in ſtrong clay ſoils. For if the wing or feather of the plough-ſhare were made nearly as wide as the intended furrow, and fixed ſo as to move parallel to the ſurface of the land, the under ſide of every furrow would be cut parallel to the ſurface, and a ſmooth floor or ſurface poliſhed by the bottom of the plough would be found under every furrow, forming a regular plane with an uniform deſcent from the top of a ridge into the water-furrow; upon which poliſhed floor or ſurface, all ſuperfluous water, after filtrating through the looſe ſoil, or furrows turned over by the plough, would find its way readily and precipitately into the water furrow, at leaſt ſo as to prevent its ſtagnating in the ſoil, ſo as to ſtarve the plants. But ſo far from guarding as much as poſſible againſt the bad effects of ſuperfluous water ſtagnating in clay ſoils, by the above palpable proceſs in ploughing, the conſtruction of the ploughs commonly made uſe of, and the method of conducting them in ſtrong clays in ſeveral parts of this kingdom, have a direct tendency to the contrary; this is done by working their ploughs in ſuch a poſition, that the wing or feather of the ſhare, being neither ſo wide as the intended furrow, nor parallel to the ſurface when at work, but forming an angle of forty or fifty degrees with the

ſame

ſame, or, in other words, moving in an oblique direction to the ſurface, turns over not a ſquare or parallel, but a triangular furrow. In which caſe it is ſelf-evident, that ſuch lands are only half-ploughed; there being ſo many ridges of faſt undiſturbed ſoil, as there are furrows, forming ſo many troughs or trenches; that of all the ſuperfluous water that ſhall fall upon ſuch lands, ſo much only as ſhall remain over and above filling the trenches will be able to find its way into the water-furrows; for ſome clay ſoils, indeed all ſoils when puddled, will hold water like a diſh; conſequently ſo much water as the above trenches ſhall contain, will remain there till it is evaporated by ſun and air, ſtarving the plants, and puddling the ſoil to ſuch a degree, that the nutritive quality in the food of plants may become ſo far impaired as not to be reſtored; or if it ſhould, the tender fibres of the roots of plants may be ſo putrified by ſtagnated water as to be incapable ever after of anſwering their intended purpoſe in promoting vegetation.

As to the bad effects of ſtrong clay ſoils caking in dry weather, nothing more eaſy to prevent; for there is a period between the time of clay ſoils running together, ſo as to puddle by ſuperfluous wet, and the time of their caking by drought, that they are as tractable as need be. Now this is the time, this is the juncture for hoeing; and ſo much land as ſhall be thus ſeaſonably hoed, will not cake or cruſt upon the ſurface, as it otherwiſe would have done, till it has been ſoaked or drenched again with rain; in which caſe the hoeing is to be repeated, as ſoon as the ſoil will quit the inſtrument, and as often as neceſſary; by which time, the growing crop will begin to cover the

ground, ſo as to act as a ſcreen to the ſurface of the land, againſt the intenſe heat of the ſun, and thereby prevent, in great meaſure, the bad effects of the ſoil's caking in dry weather.

When land is to be laid down with ſeeds, the ſeeds muſt not be ſown, as uſual, with the grain, but the day the laſt hoeing is to be performed. If ſeeds are ſown when barley is ſown, hoeing is excluded, conſequently the great advantages of drilling are fruſtrated; but not being ſown till the laſt hoeing is juſt going to take place, every purpoſe is anſwered. For the crop is not only improved by hoeing, but the ſoil in the ſpaces between the rows of corn, being cleared from weeds, and pulverized by hoeing, will be in much better condition to receive the ſeeds; and the ſeeds being ſown broadcaſt juſt before the laſt hoeing, will be incorporated with the ſoil by the action of the hoe, ſo as to vegetate much better, and produce a much better crop than uſual. The wings or moulding plates of the hoe may, or may not be uſed at all upon land that is to lie down with ſeeds.

Such ſtrong weeds as may grow directly in the rows of corn, and out of the reach of the hoe to cut up, ſhould be plucked up by hand, to prevent their coming to maturity, and dropping their ſeeds upon the ſoil, that has been previouſly made clean by hoeing.

ARTICLE XXXI.

Account of a Crop of Beans and Turnips in alternate Rows.

[By Mr. JOHN BULT, of Kingſton, near Taunton.]

GENTLEMEN,

IN reply to your Secretary's enquiries relative to my drilled crop of beans, with turnips in the intervals, I ſend you the following particulars:—

The field meaſures ſix ſtatute acres and a quarter, and is a good clayey ſoil.

The beans were planted in drills near two feet apart, on two ploughings, and horſe-hoed three times, the turnips being ſown in the intervals at the third or laſt hoeing. There has been no kind of manure or dreſſing laid on the land for ſix crops paſt, nor is there any need of it, as I find by experience, that drilling and horſe-hoeing anſwer the end fully.*

The weight of turnips was 37 tons 5 cwt. per acre, as meaſured and weighed by Mr. PAVIER, and Mr. HEADFORD. Theſe turnips are now feeding off. Thirty-one head of horned cattle, ſixty-

* The crop of beans was near three quarters per acre.

ſeven ſheep, and twenty-ſix pigs, have been maintained wholly by them for a month paſt; and what remains will keep them at leaſt a month longer. The whole expence of drawing and carting them into an adjacent field for the cattle, is between ſix and ſeven ſhillings per acre.

I am, &c.

Dec. 10, 1785. JOHN BULT.

A further Account of this Crop.

[In a Letter to the Secretary.]

SIR,

Mr. JOHN BULT, of Kingſton, called upon me on Wedneſday laſt, requeſting I would view the crop of turnips which you had written to him about.

Accordingly, (yeſterday) I went to ſee it, and muſt confeſs it gave me great pleaſure; therefore I beg leave to make a few remarks upon it. I was informed that this field (which contains little more than ſix acres) has been under a courſe of drill huſbandry for five or ſix ſucceſſive years, during which time it has had no manure or top-dreſſing. Beans were drilled upon it laſt ſpring, at leſs than two feet diſtance. They were horſe-hoed thrice; and

and at the third hoeing, the turnips were ſown promiſcuouſly among them. This was about Midſummer; and from this time nothing has been done in the field but drawing the beans, and carrying them off the land.

The crop was believed to be conſiderably above twenty buſhels per acre, which is much more than were produced by any other method in our neighbourhood the laſt ſeaſon. This account I had before I went into the field; conſequently, I did not expect to ſee any extraordinary crop of turnips, where no trouble or expence (not even ſo much as to cover the ſeed) had been taken. However, I was much miſtaken, and therefore was deſirous of knowing the weight per acre. I accordingly marked out a perch, which, after a cloſe examination, I thought to be a fair ſample of the field. We had them drawn and weighed, the nett weight was 521 lbs. which I calculate to be upwards of 37 tons and 5 cwt. per acre.

When you conſider that here was no crop loſt, no preparation, dreſſing, nor any expence whatever, (except that of the ſeed, and ſowing it) you will undoubtedly allow it to be a very profitable crop; and that it muſt be entirely owing to the cleanneſs of the ground by frequent hoeings. I

muſt confeſs, it appears to me one of the beſt recommendations of the drill huſbandry that I have ever known or heard of.

Since I was at Mr. BULT's, I have had information of two other crops on a ſimilar plan, only with this difference, that the turnips were ſown among the beans at the *ſecond* horſe-hoeing. Theſe crops of turnips are alſo very good; and the beans were more than *double* the value of thoſe raiſed in the uſual mode of huſbandry. I think it is very evident, that the beans preſerve the turnips from the fly; and as no expence or trouble attends this practice, I apprehend it will ſoon become more general.

Perſuaded, however, I am, that it can never anſwer but where the ground is made very clean, by the crops for a few preceding years having been well horſe-hoed. I alſo think the beans (which here are leſs than two feet apart) ſhould have more room. The ſun and air would be more freely admitted, and they would receive leſs damage from the operation of the hoe.

THOMAS PAVIER.

Weſt-Monckton, Dec. 12, 1785.

[N. B.

[N. B. The uncommon ſucceſs of this experiment ſeems at leaſt to militate againſt what we have ſaid in the notes on Mr. ANDERDON's crop of beans and turnips; but the caſes are by no means ſimilar. Though the land in both inſtances is called a *heavy clay*, they are very different. Mr. A's is *poor*, *wet*, and *cold*. The other a *good*, *rich* clay, and, we apprehend, naturally mixed with a kind of *marle*, which is called clay by perſons not thoroughly acquainted with the nice diſtinction of ſoils apparently alike, but very different in their nature. Our principle, therefore, that cold, wet, clay lands are unſuitable for turnips, remains unaffected by this experiment; and general practice confirms the truth of the theory.]

A ſecond Letter from Mr. Pavier, on the ſame Subject.

SIR,

BESIDES Mr. BULT's crop of drilled beans and turnips, (of which you have had already an account) there were laſt ſummer two other crops in the neighbourhood on the ſame plan, managed nearly alike with reſpect to the beans, and the beans of nearly equal value; viz. drilled in rows about twenty-two inches diſtance, twice horſe-hoed, and the produce from about twenty-five to thirty buſhels the computed acre, or (ſuppoſing the perch to be fifteen feet) from thirty to thirty-ſix buſhels the ſtatute acre. I muſt here obſerve, that the laſt ſummer was very unfavourable

unfavourable to the beans, and that the produce per acre in the common husbandry was not, on an average, in this neighbourhood, equal to a third part of the above quantity. From the best intelligence I have been able to obtain, one of these crops of turnips was considerably better than Mr. Bult's; they were sown in a field of nine computed acres on the 10th of June, after the second horse-hoeing; but whether the second hoeing was performed too soon, the ground not clean, or whatever else might be the cause, the beans were weeded by hand twice afterwards, and I suppose the turnips were somewhat benefited by it. A very intelligent farmer, who went to see the crop, who has lately done a little in the drill husbandry, and on whose veracity I can depend, has assured me that this was the best crop of turnips he ever beheld.

The turnip-seed in the other crop was put in by a hand-drill between the rows of beans; but the farmer being unused to a drill of that kind, the work was badly performed, the turnips being in some places vastly too thick, and altogether as much too thin in others; the farmer has told me himself, that where they happened to be of a proper size of thickness, it was one of the most profitable crops he ever had. This was on a very wet, heavy soil, not very favourable for turnips.

Though

Though here is no experiment fairly and accurately made, or properly related, I think the following concluſions may be juſtly drawn from the above facts:——

1*ſt.* That with reſpect to beans in particular, the drilling and horſe-hoeing is vaſtly ſuperior to the common mode of huſbandry.*

2*dly.* That the beans are undoubtedly a good preſervative of the turnips from the depredations of the fly.† And,

3*dly.* That as by this method no crop is loſt, and conſequently no rent, and but a mere trifle of expence (if any) chargeable to the turnip crop, it muſt be one of the moſt profitable, as well as the moſt certain method of propagating that uſeful root ever yet practiſed.

I might have procured ſome other inſtances of the advantages attending this method the laſt ſeaſon on ſome ſmaller ſcales; but they would only have tended to corroborate the above concluſion reſpecting the fly, which I preſume will obtain credit without further proofs, and induce ſome of your in-

* Of this there cannot be a doubt.

† This we much wiſh to ſee fully proved by deciſive experiments made in different parts of turnip fields.

genious

genious correſpondents to give it a fair trial, and report the conſequences in a proper manner.

I ſhall only take the liberty to obſerve further, that if I had an opportunity of trying this method, I believe I ſhould drill the beans in rows at a greater diſtance, in order that the turnips might be hand-hoed eaſily; that I ſhould prefer the ſmall London tick-bean to any other, by reaſon of their ſhortneſs, and being ſuch great bearers; and that I ſhould take off their tops as ſoon as the under bloſſoms begin to decay, which I am convinced would be of great ſervice.

I am, &c.

Weſt-Monkton, THOMAS PAVIER.
Feb. 11, 1786.

ARTICLE XXXII.

Experiment on drilling Horſe-Beans.

[By GEORGE WINTER, eſq.]

SIR,

MY attention for near ſeven years paſt has been employed on improvements in agriculture; and as under, I have extracted from my minute book, the particulars of the few acres I have this

this year drilled with horſe-beans, which (if the gentlemen will think it worthy their peruſal) is much at their ſervice.

The field (about ſeven acres) which produced the beans, was ſo barren, that I could not let it in the year 1783 for ten ſhillings an acre; the ſoil about four inches deep, on a very ſtiff clay, was about nine years paſt greatly impoveriſhed by burning, and improper cultivation. By my mode of management, it produced me laſt year upwards of one hundred and eighty buſhels of excellent cone wheat, nine gallon meaſure;* one hundred and forty of which I ſold for ſeed at ſeven ſhillings and nine-pence per buſhel; the remainder made very good bread for my family.

Time did not permit my ploughing up the ground, before the beginning of December laſt; and it was then done careleſsly, in irregular ridges from four feet and half to ſix feet wide, as I intended it to have been again ploughed twice more in the ſpring. The ſevere froſt fruſtrated my intentions; this field could not be cultivated before April. The ſurface was well pulverized by the froſt, and on ploughing a ſingle ridge, I found the under-ſtratum of too hard and conſolidated a

* About 28 buſhels and a half per acre Wincheſter meaſure.

texture

texture to afford me the leaſt expectation of ſucceſs by further ploughings. As the ſeaſon was ſo far advanced, I ventured in that condition (rather than loſe the opportunity of a crop) to drill in horſe-beans, two buſhels to an acre, in the beſt manner I could, in rows twenty-ſeven inches diſtant, three inches deep, and three inches apart in the rows, with irregular intervals between thoſe different ſize ridges; which drilling was performed in eight hours, on the 20th of April laſt. This was the firſt operation of my new machine, the cylinders whereof being *then* made of wood, were injured by the hardneſs of the beans, conſequently, by its continual friction, did not deliver the beans, at the laſt working, ſo regularly as I could have wiſhed; nevertheleſs, my beans appeared, in a very ſhort time, ſuperior to any planted by hand in the neighbouring fields.

On the 26th and 27th of May, the whole field was hoed, with an inſtrument containing three triangular flat ſhares, fixed in a plank, with a ſhort beam and wheel to render the working ſteady, and govern the depth, being about two inches; which cut the weeds, the three ſhares clearing the breadth of near two feet, being guided by handles, the ſame as a plough. The ſecond hoeing was performed as before, on the 26th and 27th of June.

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It was after this worked with a ſmall horſe drag rake, three feet long and eighteen inches broad, with handles to guide it. The third hoeing was executed with a Norfolk plough, had of you; turning the looſened mould to the beans. I had the ſatisfaction to find my ground work well during the exceſſive dry ſeaſon, and on examining other grounds managed in the common way, found my crop far ſuperior, which can be proved by farmers of credit and reputation. I cannot as yet aſcertain the produce, not having had them threſhed, which ſhould not be performed till near Chriſtmas, it being neceſſary to let them remain in ſtack till about that time, before which they will not be ſufficiently hardened.

In February laſt, I took the opportunity of about three days of mild weather, to plough up an old piece of ground about three acres; which, rather than let it lie a fallow, I likewiſe drilled with horſe-beans as before. On the 28th of April, it was once horſe and hand-hoed only; ſtom the appearance of that crop, I apprehend I ſhall be a loſer by it. But as it is now ploughing up for wheat, the ground appears in a much better ſtate, than if it had had a compleat ſummer fallow. My other bean grounds that were horſe-hoed, were laſt year intended for wheat, which the ſeaſon did not permit

me

me to drill; as the ridges were from four to near five feet wide, I planted on a part, the 4th of April, Windſor beans, at ſix inches diſtance in ſingle rows on a ridge. After being horſe-hoed in May, the intervals were planted with potatoes, which were afterwards horſe-hoed with the beans. My crop is not yet threſhed, therefore cannot aſcertain the produce, but it was allowed on inſpection to be the beſt according to the ſeaſon.

On other parts of the above grounds, I planted dwarf ſpeckled kidney-beans, the latter end of May and beginning of June, at three inches diſtance in ſingle rows, ſome between the broad beans, others between the four feet rows of potatoes; the latter were much injured by the potatoe haulm, which over-ran the kidney-beans; the former, having ſufficient room between the broad beans, were well kidded, and have every appearance of being productive. From the length of their horizontal roots, and the ſpace the branches occupieds I am by experience convinced, they are more productive by being planted at ſix inches diſtance in the rows, than if planted nearer.

I have likewiſe experienced, that horſe-beans at four inches diſtance, in ſingle rows about two feet ſix to eight inches apart, are much more advantageous

vantageous than having any thing planted or ſowed in the intervals, when the land is intended for a ſucceeding crop of wheat; as ſuch intervals admit of frequent horſe-hoeings, by which the land afterwards requires only being formed into proper ridges for wheat.

My pea field, of about four acres, was broke up the 28th of November laſt; drilled, on one ploughing only, with two buſhels of peaſe per acre, at the diſtance of twenty-ſeven inches between the rows; and was once horſe-hoed on the 11th of June: the produce twelve buſhels per acre. The ſoil was rather wet, ſix inches deep, on a ſtiff ſtony clay. When ploughed, it was full of cammacks and ſome ant-hills, and worked very rough; but by being well ploughed and dragged after the peaſe were off, has been brought to ſuch a ſtate as to admit of having wheat drilled in it.

All my little horſe-hoeings, amounting in the whole to about thirty-three or thirty-four acres, have been, according to my directions, well executed by Wm. Edwards, a boy, and one horſe, which performed four acres a day. The horſe, not being accuſtomed to ſuch work, induced me to employ a boy (who walked between the rows leading the horſe) rather than run the riſque of the horſe's injuring the crops.

As my drilled Siberian wheat and barley are not yet threſhed, I cannot aſcertain the produce, but from appearances it is much better than any ſowed in the common way.

The few drill-ploughs I have ſeen, have appeared to me to be very complex, which was my inducement for conſtructing the one I now uſe. Upwards of twelve months have been employed to bring it to its preſent ſtate, which, in making frequent alterations, has already been extremely expenſive. Its cylinders, *now*, are ſolid and laſting; and although (at preſent) it works well, drilling all my wheat on land that will permit, it muſt undergo another alteration to make it perfectly compleat.

Under theſe circumſtances, I am extremely ſorry it is not yet in my power to comply with your requeſt; but ſhall be able in a few months, after my wheat, &c. are all planted, to make it compleat for inſpection.

I am, Sir,

Your moſt obedient ſervant,

Charleton, Nov. 2, 1785. GEO. WINTER.

ARTICLE XXXIII.

Inſtructions for raiſing of Potatoes.

[By Mr. JOSIAH HAZARD.]

GENTLEMEN,

A Premium having been offered by the Bath Agriculture Society, for the cultivation of potatoes by farmers, &c. whoſe rent does not exceed forty pounds per annum; and the increaſe of that valuable root being of great conſequence to the poor, I flatter myſelf it will not be thought impertinent in me to give ſome inſtructions for the raiſing them to advantage.

As I ſhall point out various methods, it may be right to inform thoſe who have only a ſmall ſpot of ground, how they may obtain a plentiful crop.

Firſt then, the earth ſhould be dug twelve inches deep, if the ſoil will allow of it; after this, a hole ſhould be opened about ſix inches deep, and horſe-dung, or long litter, ſhould be put therein about three inches thick; this hole ſhould not be more than twelve inches in diameter; upon this dung or litter, a potatoe ſhould be planted whole, upon which a little more dung ſhould be ſhaken, and then

earth muſt be put thereon. In like manner the whole plot of ground muſt be planted, taking care that each potatoe be at leaſt ſixteen inches apart; and when the young ſhoots make their appearance, they ſhould have freſh mould drawn round them with a hoe; and if the tender ſhoots are covered, it will prevent the froſt from injuring them; they ſhould again be earthed when the ſhoots make a ſecond appearance, but not be covered, as in all probability the ſeaſon will then be leſs ſevere.

A plentiful ſupply of mould ſhould be given them, and the perſon who performs this buſineſs ſhould never tread upon the plant, or the hillock that is raiſed round it; as the lighter the earth is, the more room the potatoe will have to expand.

I obtained the laſt year from a ſingle root thus planted very near forty pounds weight of large potatoes, and from almoſt every other root upon the ſame plot of ground, from fifteen to twenty pounds weight; and I will venture to aſſert, that, except the ſoil be ſtoney or gravelly, ten pounds or half a peck of potatoes may almoſt always be obtained from each root, by purſuing the foregoing method. But note, cuttings or ſmall ſets will not do for this purpoſe.

The

The ſecond method will ſuit the indolent, or thoſe who have not time to dig their ground, and that is, where weeds much abound and have not been cleared in the winter, a trench may be opened in a ſtrait line the whole length of the ground, and about ſix inches deep; in this trench the potatoes ſhould be planted about ten inches apart; cuttings or ſmall potatoes will do for this method. When they are laid in the trench, the weeds that are on the ſurface may be pared off on each ſide about ten inches from it, and be turned upon the plants; another trench ſhould then be dug, and the mould that comes out of it turned carefully on the weeds. It muſt not be forgot, that each trench ſhould be regularly dug, that the potatoes may be throughout the plot ten or twelve inches from each other.

This ſlovenly method will in general raiſe more potatoes than can be produced by digging the ground twice, and dibbling in the plants; and the reaſon is, that the weeds lighten the ſoil, and give the roots room to expand. They ſhould be twice hoed, and earthed up in rows. And here note, that if cut potatoes are to be planted, every cutting ſhould have two eyes, for though fewer ſets will be obtained, there will be a greater certainty of a crop, as one eye often fails, or is deſtroyed by grubs in the earth.

Where a crop of potatoes fails in part, (as will ſometimes be the caſe in a dry ſeaſon) amends may ſtill be made by laying a little dung upon the knots of the ſtraw or haulm of thoſe potatoes that do appear, and covering them with mould; each knot or joint thus ordered will, if the weather prove wet afterwards, produce more potatoes than the original roots.

I have raiſed potatoes from the apples that grow on the haulm, but they were very ſmall the firſt year, though I found them much increaſe in ſize, when they were planted again the ſecond year; but I do not think they will ever anſwer any good purpoſe.

I obtained the laſt year from the ſmalleſt potatoes planted whole, from four to ſix pounds at a root, and ſome of the ſingle potatoes weighed near two pounds. Theſe were dug in as before mentioned, in trenches where the ground was covered with weeds, and the ſoil was a ſtiff loamy clay. I know theſe ſmall potatoes are held in contempt for planting, by thoſe whoſe prejudice will not ſuffer them to try experiments; but I can aſſure them, that they will upon trial fully anſwer their expectations; though I adviſe by no means to dibble in potatoes, as the perſon who uſes the dibble treads the

the ground, and prevents the young fibres from properly expanding.

A good crop may be obtained by laying potatoes upon turf at about twelve or fourteen inches apart, and upon beds of about ſix feet wide, on each ſide of which a trench ſhould be opened about three feet wide, and the turf that comes from thence ſhould be laid with the graſſy ſide downwards upon the potatoes; a ſpit of mould ſhould next be taken from the trenches, and be ſpread over the turf, and in like manner the whole plot of ground that is deſigned to be planted muſt be treated. And remark, that when the young ſhoots appear, another ſpit of mould from the trenches ſhould be ſtrewed over the beds ſo as to cover the ſhoots; this will prevent the froſt from injuring them, encourage them to expand, and totally deſtroy the young weeds; and when the potatoes are taken up in the autumn, a careful perſon may turn the earth again into the trenches, ſo as to make the ſurface level; and it will be right to remark, that from the ſame ground a better crop of potatoes may be obtained the following year.

For field planting, a good (if not the beſt) method is to dung the land, which ſhould be once ploughed previous thereto; and when it is ploughed

a ſecond time, a careful perſon ſhould drop the potatoe plants before the plough in every third furrow at about eight or ten inches apart. Plants that are cut with two eyes are beſt for this purpoſe. My reaſon for planting them at ſo great a diſtance as every third furrow, is, that when the ſhoots appear, a horſe-hoe may go upon the two vacant furrows to keep them clean; and after they are thus hoed, they ſhould be moulded up in ridges; and if this crop be taken up about October or November, the land will be in excellent condition to receive a crop of wheat. Lands that are full of twitch or couch graſs may be made clean by this method, as the horſe-hoeing is as good as a ſummer fallow; and if, when the potatoes are taken up, women and children were to pick out ſuch filth, not any traces of it would remain; and by laying it on heaps and burning it, a quantity of aſhes would be produced for manure.

After ploughing, none ſhould ever dibble in potatoes, as the perſons who dibble, plant, or hoe them, will all tread the ground, by which means it will become ſo bound, that the young fibres cannot expand; nor did I ever hear, that from the dibbling method, more than fifty or ſixty ſacks were produced from one acre; whereas, by ploughing them in as before-directed, I have obtained more than one hundred ſacks per acre.

Indeed, I have known good crops obtained by ploughing the land twice, and dropping the plants in every other furrow, and by hand-hoeing and earthing them up afterwards as the gardeners do peaſe; but this method is not equal to the other. Vacant places in hedge-rows might be grubbed and planted with potatoes, and a good crop might be expected, as the leaves of trees, thorns, &c. are a good manure, and will ſurpriſingly encourage their growth, and gratify the wiſhes of the planter, who, by cultivating ſuch places, will then make the moſt of his ground, and it will be in fine order to receive a crop of corn the following year.

I ſhall now conclude by noting, that gravelly, ſtony, chalky, or ſtiff clay land, will never produce many potatoes; and the few they do produce, will be cankered and only fit for pigs; it is therefore obvious, that ſuch ſoils are improper.

If theſe few looſe hints are worthy the acceptance of the Bath Agriculture Society, I am happy in having the honour of communicating them, and am, with great deference,

Their obedient ſervant,

JOSIAH HAZARD.

Stoney-Littleton, Feb. 18, 1786.

ARTICLE

Article XXXIV.

On the Suffolk Breed of Cows; raiſing Potatoes, &c.

[In a Letter to the Secretary.]

Sir,

I Rejoice to learn from you, that your patriotic Society are preparing to print a third volume of their correſpondence; the two former gave ſuch general ſatisfaction, and were ſo truly uſeful to the publick, that every well-wiſher to the proſperity of this country muſt earneſtly wiſh a continuance of them.

In conſequence of the great approbation you expreſſed of my breed of cows, when I had the pleaſure of ſhewing you my farm laſt ſummer, I take the opportunity of mentioning ſome particulars relative to them, in what articles I think them preferable to the other breeds, with the mode of their treatment, and the uſual profit of them. The cows you ſaw were bred from the polled or hornleſs Suffolk dun-coloured cows, (than which, for *profit*, though not for *beauty*, I think, with the moſt intelligent Mr. Young, there is not ſo valuable a breed in England) by a Derbyſhire black and white bull, given me by my friend Lord Townshend. This mixture produced their uncommon colour of mouſe

mouſe and white, as well as that ſhape and make which pleaſed you, and is ſo much eſteemed by the beſt judges of cattle; their heads and necks being ſmall, their legs ſhort, carcaſes large and deep, and loins remarkably broad; and being of greater weight in ſeemingly leſs compaſs than any beaſts I ever ſaw; whether, from being without horns, from being conſtantly kept in ſhedded yards or houſes during the winter, from their nature, or from theſe cauſes altogether, they are ſo tame and docile, that I never knew any miſchief done by them to any other animal. In the ſummer, for the ſake of ſhade, and in the winter for ſhelter, they herd together in the manner of ſheep; without offering the leaſt injury to each other. They feed in the park in ſummer; and in winter, ſuch of them as are not in full milk, are fed in the yards on barley or oat ſtraw, and on the leaves and offal of the turnips, which are given to thoſe which have more lately calved, and are kept in the houſe; thoſe houſed have therefore, you ſee, the roots, and beſt of the turnips or cabbages with ſtraw, (for hay is never given here to cows.) Their average profit per annum, when a regular account of them was kept a few years ſince, was, after all charges deducted for keeping, and every fair article of expence, four pounds per cow; but as this profit will probably be found ſhort of the profit of many other breeds

breeds, it ſhould be mentioned, that the weight of theſe beaſts on an average, as they are in milking, does not exceed thirty-ſix ſtone; ſome indeed are bigger, but others are not ſo large. For hardineſs, docility, and ſhape, I think there are few to compare to them. But to obtain, and preſerve the laſt, in theſe, and every ſpecies of animal, there ſhould be an uniform and conſtant attention paid to the rearing always the beſt and prime of the ſtock, and getting rid of every other. That, and that alone, will, I believe, go near to enſure a good, valuable, and handſome ſtock of every kind.

You will not be ſorry, perhaps, to know what was the produce of ſome of the different kinds of the potatoes you ſaw growing in my experiment field; I will therefore inform you, that the white Champain (of which you ſaw about two acres) produced me at the rate of three hundred and forty-ſix buſhels per acre. That another kind, procured me by a friend from Mancheſter, (of which I had ſufficient to plant ſix rods, or perches of land) produced at the rate of ſix hundred and forty-eight buſhels per acre; and that the ſort given me by our ingenious friend Mr. RIGBY, who received them from Liverpool, and which had been only two or three years before raiſed *from ſeed*, were planted on one, and the ninth part of a rod or perch

perch of land; and produced at the rate of one thouſand and eighty buſhels per acre. The Champain were fit for uſe ſooner than the two other kinds, by about ſix weeks; but were neither ſo large, nor numerous upon the roots. All theſe kinds were dry, mealy, and well-flavoured, ſcarcely differing from each other in taſte. They were all cultivated by the plough, in the ſame field, in the ſame manner, and at the ſame time; the difference of the produce is prodigious, owing, I conceive, in ſome meaſure, to their having been longer, or more lately raiſed from the ſeed; this obſervation has, I know, been made by others: but be it as it may, I will propagate the laſt ſort upon as large a ſcale as my ſtock of them will permit; and if I find them continue as productive as in the laſt year, I will be ſure to communicate the ſtock to you, if you wiſh to have it. I have chiefly applied them to the feeding of hogs. When boiled, and given to fattening ſwine, I have not found them anſwer alone; but mixed with an equal part of barley, or buck-meal, I have had them equally fat, and in as ſhort a time, as thoſe which were fed with either of the meals alone. Given raw, they are admirable for ſtore ſwine, or cows, or bullocks. Our poor people are now ſo fond of them, and find ſuch ſupport from them, that they are very generally cultivated by them for ſome miles round this place.

It

It is much to be wiſhed they were univerſally encouraged. The different houſes of induſtry in this county having now adopted the uſe of them.

The turnip-rooted cabbages you ſaw, are in great perfection, but reſerved until the latter part of the ſpring, when no other green vegetable can be had. The cabbages were uſed during the laſt ſnow, and weighed moſt of them, after the loſs of all their outward leaves, upwards of a ſtone each.

I am, with the ſincereſt good wiſhes,

Your obedient humble ſervant,

THOMAS BEEVOR.

Hethel, Norfolk, Jan. 28, 1786.

ARTICLE XXXV.

On River Weeds as a Manure.

GENTLEMEN,

AMONGST the variety of manures that have been recommended to give a ſtimulus to the vegetative principle in land, I do not recollect the weeds of rivers to have been mentioned by any writer on agriculture. Sea weeds have been found, by

by long and repeated practice, to be very efficacious in promoting vegetation; especially when reduced to putridity by mixing them in compost with lime and earth. But these can only be locally applied. The interior parts of the kingdom receive no advantage from them; but river weeds might be collected, and applied with equal, if not superior, advantage in almost every parish.

Being situated by a river, I had frequently regretted the quantity of weeds impeding the stream, and being the occasion of many little islands forming, which frequently in very rainy seasons caused floods and inundations, destructive of convenience, and sometimes of life. To prevent this in some measure, it is usual for the weeds in common unnavigable rivers, to be cut twice in the summer months. In this practice, the occupiers of mills and of meadows are interested; the *latter* from the fear of inundations on the suddenness of heavy rains; the *former* peculiarly so to open the current, and admit the water below to pass away freely. But little care is taken to disincumber the stream, unless in some places to draw them out on the banks, where they are suffered to remain as a nuisance, without any useful or profitable application. Having frequently observed this, I determined to try their effect as a manure in their green state. I

therefore

therefore tried them on ſome garden ground, and they appeared to anſwer my expectation. But as this ſmall experiment was not fully deciſive, I prevailed on a neighbouring farmer to try them on one acre in a large turnip field then preparing, and on that acre entirely to omit any of the compoſt with which the reſt of the field was manured. This he exactly conformed to, and threw the water weeds into every furrow that was at the next turn filled up by the plough. The conſequence was, that by the moiſture and fermentation of the weeds, the ſeeds vegetated much ſooner than on the reſt of the field. They alſo grew quicker, and were ſuperior both in the ſize of the roots and luxuriance of the leaves, ſo as to render the ſpot very conſpicuous in the field.

But impartiality obliges me to remark, that in the ſucceeding crop, (barley) there was a perceivable inferiority to the reſt of the land. Whether this proceeded from the weeds or ſome other cauſe, I cannot determine; but the ſucceſs of this trial (with reſpect to the turnips) being deciſively in its favour, induced me, in the following ſummer, to collect a conſiderable quantity of theſe weeds, and to lay them by the ſide of a common reſervoir of dung, but not to incorporate them with any part of it; and when the maſs was removed, it did not

appear

appear to have imbibed any of the manure. This I laid on ſome land of my own, ſimilar to that on which the former experiment was made. It was ploughed in the latter end of October the ſame year on a peaſe ſtubble, and wheat *ſet* by hand upon it. The whole field was a good crop, and the part on which the weeds were laid not at all inferior to the reſt, on which ſtable-dung had been ſpread in the uſual mode of the Norfolk huſbandry. Though this experiment was made as unmixed as poſſible, with a view to aſcertain the vegetative virtue reſulting from the weeds ſingly, (and proved it by the crop being equal to thoſe parts of the field which had been dunged) yet I conceive, it would act with additional energy when mixed in compoſt with other manures. It would probably quicken their operation, and derive from them a permanency which ſeems moſt likely to reſult from an union of animal and vegetable ſalts and oils. That they ſucceeded without mixture on a light ſandy ſoil in the turnip crop experiment, is evident; and as the time of their firſt cutting, is that of ſowing turnips, it gives opportunity for thus applying them with little trouble or expence.

I am, &c.

JOHN WAGSTAFFE.

Norwich, Feb. 4, 1784.

ARTICLE

Article XXXVI.

On the Culture of Buck-Wheat; Wheat, and Potatoes, alternately; and the uſes of Buck-Wheat.

[In a Letter to the Secretary.]

Sir,

I AM not only at all times well inclined to forward the views of your patriotick eſtabliſhment, but I conſider the flattering teſtimony of the Society's approbation, which I lately received for raiſing a crop of buck-wheat, to have impoſed on me a particular obligation to communicate the beſt information in my power, reſpecting the cultivation of that vegetable; and this I undertake with the more readineſs, from a conviction of its great utility, and that it deſerves the attention of every tillage farmer.

It was in 1780 that I began this culture. About ſeven acres of a ſandy ſoil on Briſlington common,* having been firſt tolerably well cleanſed from brambles, furze, &c. received one ploughing. To reduce the irregularities of the ſurface, it was rolled; and on the 9th of June in that year, two buſhels and a half of buck-wheat per acre ſown, the ground rolled again without harrowing.

* A very rough piece of land, at that time juſt incloſed.

The

The vegetation appeared in five or ſix days, as is conſtantly the caſe be the weather wet or dry. The growth was ſo rapid, that the fern, with which this land greatly abounded, was completely kept under. About the middle of September the crop was mown, but, by reaſon of a great deal of rain about that time, it was not ſecured until the beginning of October; hence a loſs of great part of the grain by ſhedding, as well as ſome eaten by birds. However, there were ſaved about twenty-four Wincheſter buſhels per acre, which, notwithſtanding its long expoſure to the weather, received no ſort of damage, only perhaps, that the fineſt and moſt perfect grain was the firſt to fall from the plant. The ground after this had almoſt the appearance of a fallow, and was immediately ploughed.

When it had lain a moderate time to meliorate, and to receive the influences of the atmoſphere, it was harrowed, ſown with Lammas wheat, and ploughed in under furrow, in a contrary direction to the firſt ploughing. Thus a piece of land, which in the month of April was altogether in a ſtate of nature, in the following November was ſeen under a promiſing crop of what is well ſtiled the king of grain, and this without the aid of manure, or of any very great degree of tillage. Nor was the harveſt by any means deficient; for ſeveral perſons

converſant in ſuch things eſtimated the produce from twenty-ſix to thirty buſhels per acre; I had not then the precaution to regiſter the exact meaſure. As ſoon as the wheat crop was taken off, the ground had one ploughing, and on the 1ſt of September following was ſown with turnip-ſeed. The turnips were not large, but of an herbage ſo abundant, as in the following ſpring to ſupport one hundred and twenty ewes with their lambs, which were fed on it by folding four weeks. After this it was manured with a compoſition of rotten dung and natural earth, about twenty putt loads per acre, and planted with potatoes. The crop ſold for one hundred and thirty-eight pounds, beſides a conſiderable number uſed in the family, and a quantity reſerved with which ten acres were planted the following ſeaſon. The enſuing autumn it was again ſown with wheat, and produced an excellent crop. In the ſpring of 1784, it was manured and planted with potatoes, as in the preceding inſtance; the crop (though tolerably good) by no means equal to the former, producing about one hundred ſacks per acre only.

This land is now for the third time under a crop of wheat, it being my intention to try how far this mode of alternate cropping, one year with potatoes, and another with wheat, may be carried.

From

From the ſucceſs of the preceding experiment on buck-wheat, as alſo of that for which I was honoured with the Society's premium, and various others which I have made for ſeveral years paſt, it is become with me a favourite object of cultivation; being clearly of opinion, that it ought in numerous caſes to ſuperſede the practice of ſummer fallowing; for the crop produced ſeems not only to be ſo much clear gain in reſpect to ſuch practice, but alſo affords a conſiderable quantity of ſtraw for fodder and manure; beſide that I think a ſummer fallowing is nothing like ſo advantageous a preparation for a ſucceeding crop. From its quick and luxuriant vegetation, it is an admirable deſtroyer of weeds, and ſuits with a dry, light, mellow ſoil, but flouriſhes moſt in a light ſand. It is impatient of wet and cold.

The proper ſeaſon for ſowing I take to be from the middle of May to the middle of June.* I have ſown it however ſo early as the beginning of April, and ſo late as the 22d of July, by way of experiment, but have found the latter extreme rather to be choſen. In another experiment, a ſmall piece of land brought to maturity the grain of two different crops in the ſummer of 1783.

* The laſt week of May, or the beginning of June, is ſtill better; as the leaſt froſt will cut off the plants at their firſt appearance, it being a native of a much warmer climate.

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From

From the ſucceſs of the preceding experiment on buck-wheat, as alſo of that for which I was honoured with the Society's premium, and various others which I have made for ſeveral years paſt, it is become with me a favourite object of cultivation; being clearly of opinion, that it ought in numerous caſes to ſuperſede the practice of ſummer fallowing; for the crop produced ſeems not only to be ſo much clear gain in reſpect to ſuch practice, but alſo affords a conſiderable quantity of ſtraw for fodder and manure; beſide that I think a ſummer fallowing is nothing like ſo advantageous a preparation for a ſucceeding crop. From its quick and luxuriant vegetation, it is an admirable deſtroyer of weeds, and ſuits with a dry, light, mellow ſoil, but flouriſhes moſt in a light ſand. It is impatient of wet and cold.

The proper ſeaſon for ſowing I take to be from the middle of May to the middle of June.* I have ſown it however ſo early as the beginning of April, and ſo late as the 22d of July, by way of experiment, but have found the latter extreme rather to be choſen. In another experiment, a ſmall piece of land brought to maturity the grain of two different crops in the ſummer of 1783.

* The laſt week of May, or the beginning of June, is ſtill better; as the leaſt froſt will cut off the plants at their firſt appearance, it being a native of a much warmer climate.

The uſe to which I have hitherto applied the grain hath been moſtly in feeding hogs, for which I eſteem it equal in value to barley; it is much more eaſily and conveniently ground than barley, as a malt-mill will grind it completely. Horſes are very fond of the grain, and poultry of all ſorts are ſpeedily fattened by it. Probably it may hereafter be found a material article in diſtillation, ſhould a ſufficient quantity be raiſed with that view. After ſpring feeding, a crop of cole-ſeed, turnip-rooted cabbage, or vetches, there will be ſufficient time to ſow the land with buck-wheat. Probably, a crop of vetches might be mown for hay early enough to produce a crop of this grain after it.*

The bloſſom of the plant affords food for bees at a very opportune ſeaſon of the year, when the meadows and trees are moſtly ſtripped of their flowers. As far as conjecture reaches, I have ſeen a greater number of bees labouring at once upon my buck-wheat flowers, than could poſſibly belong to all the hives in our pariſh; and to one fond of rural amuſements, the ſcene is truly delightful. The Engliſh term *buck-wheat*, ſeems to be a corruption. I am rather inclined to think it ought to be *beech-wheat*, from its likeneſs in ſhape and colour to the beech maſt, alſo from its claſſical name

* Only in hot dry ſummers.

fagopyrum.

fagopyrum. I have likewiſe ſeen it termed beech-wheat in an Engliſh treatiſe on huſbandry, written in the reign of Henry VIII.

I rely upon the candour of the Society to excuſe inaccuracies, and ſuch remarks as may ſeem foreign and unimportant. If any of my obſervations ſhould be thought to merit conſideration, it will be matter of abundant gratification to

Your moſt obedient ſervant,

NEHEMIAH BARTLEY.

Briſtol, Feb. 8, 1785.

ARTICLE XXXVII.

On the Neceſſity of Hoeing Turnips.

Addreſſed to the Farmers in the Weſt of England.

[By ARTHUR YOUNG, eſq.]

NOTHING ſounds ſo wonderful to Eaſt-country farmers as hearing of the conduct of their brethren in the Weſt, who do not hoe their turnip crops. Long and univerſal practice has given the Eaſt-country farmer the moſt complete conviction, not of the propriety only, but of the abſolute neceſſity of this operation.

Without hoeing, we ſhould get a produce on our beſt lands of, perhaps, two, three, or at moſt four tons on an acre, and that chiefly leaf. With hoeing, we get from twenty to thirty-five tons of root only; and if leaf were an object, much more than is ever gained without. The difference in the mere quantity of the crops, therefore, would alone be an argument powerful enough to be perſuaſive to men who will give their underſtandings any play; but there are other circumſtances not leſs important, that ought to be taken into conſideration.

The hoeing not only thins the turnips, and makes them large, but it deſtroys all weeds that may have riſen in the field from the laſt ploughing; a ſecond hoeing repeats this; and in favourable ſeaſons a third may be given; ſo that one great object (the greateſt in my opinion) of ſummer fallowing, that of killing weeds, is better anſwered than it can be by ploughing. Whoever will coolly conſider this point, cannot fail to admit the great efficacy of this improved huſbandry.

I muſt ſtill view this object in yet another light. Summer fallowing is attended in various caſes with a very bad effect. There is reaſon to believe, that the action of the ſun-beams impoveriſhes land when

when in tillage. It volatilizes and exhales thoſe finer particles, on which depend, or with which is connected, the food of plants; but where huſbandry is very ill underſtood, and the farmers have no correct ideas of the due arrangement of crops, this evil is properly ſubmitted to, in order to effect the deſtruction of weeds by ploughing. How valuable then is the turnip culture, which by means of hoeing deſtroys the weeds, and at the ſame time covers the land from the action of the ſun, in thoſe months which are oftentimes the hotteſt in the year!

If the land be well tilled and pulverized, I am inclined to think, that many weeds may rather be propagated than killed by the turnip huſbandry without hoeing; for if the ploughings be given in a quick ſucceſſion, the roots and ſeeds will be tumbled about too faſt for vegetation, and when the land is ſown and left to repoſe, they will grow very faſt; and if no hoeing follow, the ſucceſſive crops will, by their weedy appearance, ſhew that little benefit is derived from this very imperfect management.

That the right conduct is to hoe, cannot be doubted; but the queſtion is, how to enforce it? Your excellent Society of true and genuine patriots have done much in almoſt every branch of huſbandry;

dry; nor has this object been neglected by them: But probably, the beſt means of diſſeminating the practice, will be found that of importing a few good hoers from Suffolk, [the beſt part of the county for ſuch a purpoſe is the angle between Woodbridge and Orford] and to give premiums for all the hands they inſtruct, and to all that are inſtructed by them; with an honorary reward to that gentleman who ſhall import one or more for the ſame purpoſe. Perhaps this ſubject deſerves a further attention previous to the next ſeaſon.

ARTHUR YOUNG.

ARTICLE XXXVIII.

On the Eſſex mode of cultivating and applying Potatoes, Carrots, Winter Vetches, &c. &c.

[In a Letter to the Secretary.]

SIR,

YOU have no reaſon to apologize for requeſting of me the leiſure of a few hours on agricultural ſubjects, as I ſhould eſteem many days moſt uſefully employed, that could in any degree further the views of the Bath Agriculture Society; who appear to me to form an antidote to the dangerous

gerous allurements of the ſpot where they aſſemble, and to have erected the temple of induſtry in the vale of pleaſure. May they prevail on the votaries of the one, to prepare for its relaxations, and double its enjoyments, by being firſt initiated in the trials and myſteries of the other; and thus to learn, that a taſte for rational employment is the eſſential preparative for rendering amuſements juſt in their purſuit, and innocent in their effects! Without this, ſuch amuſements muſt in their end, if not their aim, (however harmleſs they may appear) be merely a vicious diſſipation.

Potatoes, (of which you propoſe ſome queries to me) I have tried only on a very trifling ſcale, among the intervals (for the firſt two years) of a little plantation. By working the ſoil, their vegetation encouraged that of the young trees, and the produce amply paid for every attention to the ground.

In this county, within about twelve miles of London, they are now extenſively cultivated; but in what mode, or ſucceſſion of crops, I know not.

For *ſmall* pork, when baked or boiled, mixed with a little barley-meal, we have found them excellent; but for *large hogs*, they are moſt profitably given raw, if theſe have at the ſame time the ſhack

of

of the barn-door in threſhing ſeaſon, or occaſionally a few beans; and may thus be brought forward at a cheaper rate, for—what, we think, will alone make large meat and firm bacon—peaſe and barley-meal.

We have tried them in bread: it was excellent, but the loſs of weight in the baking, and the time and delicacy of the proceſs, rendered this, as it indeed does moſt of theſe things, far from eligible œconomy for the poor.*

I take the liberty of mentioning what we found, to our very great ſatisfaction, in a newſpaper, that potatoes ſhould be dreſſed in an iron pot, over a ſlow fire, without any other water than what the fire will gradually extract from the root itſelf. By this mode, they are far more dry, mellow, and rich, than when any other water is added to them. But this is a proof of their being a very cold food raw.

However valuable from eaſe of culture, and greatneſs of produce, to the poor eſpecially, in all ſmall ſpots; I doubt, unleſs near large towns, whether, on a *farming* plan, potatoes be ſo eligible as other herbage or roots, eſpecially as carrots, which I cannot but *ſurmiſe* (for my trials are too trivial to

* The moſt œconomical uſe of potatoes both for rich and poor, is to eat them plain boiled. For cattle, they will do raw; but for hogs, boiling is preferable.

venture

venture bolder language) deſerving every encouragement, even on ſoils hitherto thought too heavy for them.

Our prodigality in the number of horſes kept, and the mode of keeping them, renders ſome ſubſtitute for oats eſſential. From the price oats muſt on that account ever bear, from the ſuperior quality of their ſtraw as winter food for cattle, and from there being leſs delicacy required in the cultivation of the ſoil for their produce, they are rendered *as valuable* to the farmer as a crop of barley; and conſequently the export of the latter, even when *manufactured* into malt, is impeded and impaired, by what, comparatively, ought to be regarded as an unprofitable grain. Let our export of other grain be therefore what it will, a very heavy deduction on this *moſt national profit*, muſt now be made by the importation of oats, or we muſt ſtop this drain, by ſubſtituting them in cultivation for barley at home. A deſperate alternative!

In this part of Eſſex, on a whole year's fallow after wheat, barley is generally ſown; and by the produce of at leaſt one quarter more in quantity, (on a medium five quarters per acre) and its ſuperior quality, it is ſuppoſed to pay for the omiſſion of any hoeing crop that might have preceded it.

But

But this very land, which requires ſuch delicate and expenſive proceſs for barley, will, without the fallow, (with the admiſſion of beans, peaſe, or turnips) produce an *equal* quantity of oats. For the two laſt years, three parts of my field for oats were thus *perfectly* fallowed after wheat, and the other part cultivated with cabbages and turnips for winter provender; and in both trials, agreeably to what a very conſiderable farmer had aſſured me, my crop of oats (a grain not requiring that nice pulverization of the ſoil, ſo eſſential to barley in the ſowing tilth) was in quantity and quality, after each of the crops of winter herbage, fully equal to the returns of the *expenſive* fallow. The conſequence to me is, that as from motives of convenience I never ſow barley, I ſhall yet probably exceed in my profit my neighbours that do, as I can avoid that *compleat fallow* by ſubſtituting oats; to which they muſt neceſſarily ſubmit.

I am from experience convinced, that an acre of carrots will double in the quantum, of equally hearty provender, the product of an acre of oats; and from the nature of their vegetation, the nice mode of cultivation, and even of taking them up, (all of which, expenſive as they are, bear a very inferior proportion to the value of a medium crop) muſt leave the land, eſpecially if taken off it in an early

period,

period, ſo mellow for the plough, as to form a ſeed-bed for barley, equal to any fallow tilth.

I apprehend too, the land *proper* for barley, immediately *after a vegetable crop*, is well ſuited to the produce of carrots. If this apprehenſion be well founded, (and ſurely, even on conjecture, in a *ſmall ſcale* it merits a general trial on ſoils *tolerably light*) the horſes in ſuch places might, for the winter half year, be maintained for the ſtrongeſt work without oats, and the ſoil aſſigned to that crop be thus amply prepared for the more mercantile one of barley.

I mention only horſes, becauſe for them a ſubſtitute is chiefly wanted. For other cattle, we have a variety of winter vegetables, but none (as far as my ſmall trials extend) that wear the ſoil ſo little, prepare it for the following crop ſo well, and are ſo nutritive and ſweet in their effects, as carrots. The few that I have this year, and which (as they ſuſtained but little injury from the froſt of laſt year) will probably remain in the ground till it is neceſſary to plough it up for oats, were, from the drought of laſt ſpring, ſo imperfect a plant, that, after ſtrong harrowing, I ſowed over them a crop of turnips, and have now in *this mode* a better piece of this herbage, with the additional chance of the carrots, than moſt of my neighbours.

As

As the little arable land I cultivate is chiefly ſubſervient to the paſturage of a few cattle, I have been rather whimſical in my attempts at the beſt for winter and ſpring, but have always found that it requires a much ſounder land than ours chiefly is, to venture in any extenſive degree at winter grazing. Cabbages in ſuch a ſpot, as being planted on ridges, and wanting a ſtronger ſoil, ſeem preferable to turnips; but on an enquiry lately among the great dairy-farms of the heavy part of Suffolk, I found the culture of cabbages had declined, from ſome experience of the deficiency in the ſucceeding crop of barley.*

For early ſpring feed, I know nothing ſo certain, and ſo little expenſive (which with us, winter tares, a moſt excellent paſturage, *are not*) as rye-graſs, ſown as clover with oats or barley; the uſual objections to this graſs appear to me to be entirely obviated, by ſowing it *extremely* thick, not leſs than a buſhel and half or two buſhels per acre, which renders it proportionably fine; and feeding it as *early* and as *conſtantly* as poſſible; by this management the turf turns in at the next autumn for wheat, as richly as the uſual clover-ley; and has with me produced as good crops of corn.

* This will be the caſe when leguminous crops are not *fed off* the land, which cabbages cannot be.

I laſt

I laſt year tried, inſtead of the common, the perennial red clover, called cow-graſs, (*trifolium alpeſtre*) the ſeed from it was moſt luxuriant, and the butter excellent; in autumn it was turned in for wheat, of which there is on it (at preſent) the fineſt plant. If this graſs be nearly equal to the common clover in produce, without danger like that to cattle in its effects, far ſuperior in the flavour of its juices, and not an inferior bed for a crop of wheat, it merits very general attention. For my neceſſities, it is not *ſufficiently early*; on this very account, I again laſt ſpring ſowed rye-graſs, with 5lb. per acre of burnet with my oats, for the early feed of the enſuing ſpring; and have not ſuffered it to be *at all fed* in autumn. The graſs has grown very well ſince harveſt, and will, I apprehend, ſo bear the winter, as to be ſufficiently early: but the burnet is probably ſo impeded by it, as to appear very thin and weak, and (conſidering the price of its ſeed) does not appear to anſwer my purpoſe; unleſs the field were to continue in graſs for at leaſt two years, when the burnet might have time to ſpread into a very early piece of ſpring paſturage, and fully anſwer its expence.

I have twice after wheat tried a little brank or buck-wheat; though my land is not light enough for it, it is extremely convenient; ſince not being

ſown

ſown till May at the ſooneſt, the land may leiſurely be fully fallowed, and ſeems ſo little to foul or wear it,* that when off in October, it may be ridged up at once into a winter fallow, for barley in the ſpring.† All poultry, and hogs when running about, thrive upon it, and even ſtall'd oxen; and horſes, when mixed half with oats. The ſtraw is tolerable provender for the cow-yard.

I am, reſpectfully your's,

C. ONLEY.

Stiſted-Hall, Eſſex, Jan. 5, 1786.

ARTICLE XXXIX.

On Steeping Seed-Barley in a Dry Seaſon.

[In a Letter to the Secretary.]

SIR,

MY great ſucceſs in making the following experiment, occaſions my communicating an account of it to you, for the benefit of the publick, if thought worthy a place in the third volume of the Bath Society's experimental papers.

The laſt ſpring being remarkably dry, I ſoaked my ſeed-barley in the black water taken from a re-

* On the contrary, it will clean it more than any thing except turnips. † Or immediately ſown with wheat.

ſervoir

ſervoir which conſtantly receives the draining of my dung-heap and ſtables. As the light corn floated on the top, I ſkimmed it off, and let the reſt ſtand twenty-four hours. On taking it from the water, I mixed the ſeed grain with a ſufficient quantity of ſifted wood aſhes, to make it ſpread regularly, and ſowed three fields with it. I began ſowing the 16th, and finiſhed the 23d of April. The produce was ſixty buſhels per acre, of good clean barley, without any *ſmall* or *green* corn, or weeds at harveſt. No perſon in this country had better grain.

I ſowed alſo ſeveral other fields with the ſame ſeed dry, and without any preparation; but the crop, like thoſe of my neighbours, was very poor; not more than twenty buſhels per acre, and much mixed with *green* corn and weeds when harveſted. I alſo ſowed ſome of the ſeed dry on one ridge in each of my former fields, but the produce was very poor in compariſon of the other parts of the field.

I am, &c.

JAMES CHAPPLE.

Bodmin, March 12, 1784.

[We conſider this experiment as a very intereſting one, and recommend general trials to be made both in wet and dry ſpring ſeaſons.]

Article XL. *On the Culture of Potatoes.*

[By Mr. Joseph Webb.]

Gentlemen,

As the diffuſion of uſeful information amongſt mankind in agriculture, is evidently the end and deſign in the inſtitution of your laudable Society at Bath, I beg leave, through your permiſſion, to lay before the publick, in your next publication, the method I have made uſe of for near twelve years in the ſelecting proper potatoes for ſeed; during which time I have never loſt a crop, or any part thereof worth mentioning, by what is called the curled or blighted potatoe.

Several of your correſpondents ſeem to think, that the fault is in the nature of the ſoil in which they are planted; but from this, I believe, I may with the greateſt confidence diſſent, at leaſt it has not been ſo in my practice, and, I believe, I have had as great a ſhare thereof as moſt men; for during the late war, I uſually planted between twenty and thirty acres, and ſometimes many more in a year.

About eighteen years ago, I took a large garden near Portſmouth; at that time potatoes were not much

much uſed in theſe parts, and their culture much leſs underſtood. I believe, I planted more than all the other gardeners at that time in this iſland: I ſet of the ſame ſort of potatoes that I found on the premiſes from year to year, for five or ſix years; but to my great loſs and ſurpriſe, I generally loſt half, and ſometimes nearly all my crop, by their being blighted, or infected with what is called the curled diſeaſe.

I then changed my ſeed for ſome which grew at or near Torbay; the firſt year they did very well. I planted of the produce of this ſeed the next year, and recommended the ſame to ſome of my friends at Southampton, Wincheſter, Hambledon, and Chicheſter, thinking it was very good; but to our great diſappointment, we loſt the greateſt part of our crops, although at ſo conſiderable a diſtance, and I believe very different ſoils: from whence I infer the fault is not in the land, but in the ſeed.

I was forced hereby to try a different method, and ſoon after Chriſtmas made a hot-bed in the following manner:—(which method I have uſed ever ſince) I laid horſe-dung, &c. (as is generally uſed in making hot-beds) about eighteen inches thick, over which I ſpread a layer of fine rich mould about four or five inches thick; upon the

top of this mould I laid, in different diviſions, a certain number of potatoes of various ſorts, ſome of my own growth, and others bought from different parts, and covered theſe lightly over with more mould; they ſoon came up. I then obſerved which was freeſt from the blight or curl; for if there were not more than one defective in *forty* or *fifty*, I concluded I might ſet of that ſort with ſafety. This method I have now practiſed near twelve years, and never loſt my crop or any part thereof worth mentioning, whilſt my neighbours, who followed the old method, were frequently diſappointed in their crops; and to the beſt of my knowledge, all thoſe of my neighbours who have of late been perſuaded to take the trouble of uſing the ſame means as myſelf, have never failed of ſucceſs to their utmoſt wiſhes in one inſtance; nor do I ever think it will fail, if duly attended to; the fault being ſome hidden cauſe in the ſeed unknown at preſent, and I believe incurable by any means, at leaſt that have yet come to my knowledge.

My reaſon for planting my hot-beds ſo ſoon is, that if the froſt hinders the firſt experiment, or they all prove bad, I may have time to make a ſecond or third if neceſſary, with different ſorts of ſeed, before the proper ſeaſon arrives for planting in the fields and gounds appointed for the great and

and general crop. Wiſhing you ſucceſs in your laudable undertaking, I remain,

Gentlemen,

Your obedient ſervant,

JOSEPH WEBB.

Portſea, Hants, Jan. 18, 1785.

ARTICLE XLI.

A new Method of ſhortening the Operation of Churning deſcribed and recommended.

SIR,

MY ears having of late been often ſerenaded with the monotonous muſick of the butter-churn from morning till night, I have endeavoured to find out ſome contrivance for accelerating that operation, ſo particularly tedious at this ſeaſon of the year; and I have the ſatisfaction to inform you, that my endeavours have not been unſucceſsful.

I recollected to have heard when a boy, that a bit of ſoap ſlipt into the churn, would effectually plague the dairy-maid, by preventing the cream from ever producing butter. Whether this effect would follow, I never had the miſchievous inclina-

tion to try. However, I took it for granted, and imputed it to the alcaline ſalt contained in the compoſition of the ſoap. Hence I conceived, that ſome chemical preparation of an oppoſite quality might produce as oppoſite an effect. I could think of nothing ſo likely to anſwer this purpoſe, and at the ſame time ſo innocent, as the *vegetable acetous acid.* Accordingly, when the next operation of churning had been going forward for half the day, I cauſed a little diſtilled vinegar to be poured into the churn, and the butter was produced within an hour afterwards. It has ſince been regularly made uſe of for this purpoſe, and always with the deſired ſucceſs.

If the ſuppoſition be admitted, that the cream of *old* milk (and ſuch is milk for the moſt part at this ſeaſon) contains much ſtronger alcaline ſalt, or at leaſt more of it than *new* milk does, then the effect of the vinegar is readily accounted for on the known principles of chemiſtry. It is an acknowledged property of *alcalies* to unite with oil into a ſaponaceous maſs, and to render them intimately miſcible with water. But it is likewiſe well known to chemiſts, that there is a nearer affinity, (as they term it) a much ſtronger elective attraction between *acids* and *alcalies*, than between alcalies and *oils.* Conſequently, the acid, being mixed with

with the cream, immediately attaches to itſelf the *alcaline ſalt*, which is the bond of union, as we may call it, that holds together the *oleaginous* and *aqueous* particles, and leaves them eaſily ſeparable from each other.

It may perhaps be objected to this mode of practice, that the acid mixing with the cream would render the butter unpalatable; but this on experience I do not find to be the caſe; and indeed I ſhould not myſelf have ſuſpected it; as the butter is uſually well waſhed in two or three changes of clean water, by which the whole of the acid is carried off; or if ſome few particles remain, they are *ſo few* as not to be perceived by the taſte, and perhaps have rather a deſirable effect than otherwiſe, by acting as an antiſeptic, and preventing the butter from becoming rancid ſo ſoon as it otherwiſe would do.

Whether it may be beneath the dignity of your inſtitution to pay any regard to a communication of ſo trifling a nature, I will not preſume to determine. But I apprehend you will agree with me, that by a ſtrict attention to the minutiæ of rural œconomics, the farmer will be the better enabled to pay his rent, and to live comfortably. By the accumulation of *pence*, the *pound* is acquired. And

I have

I have reaſon to think, the farmer would find himſelf ſome *pence* the richer in the courſe of a year, by attending to this information; at leaſt, I am confident it would ſhorten the labour of many a weary arm, and prevent much vexation to a multitude of good houſewives.

My experiments have not as yet aſcertained the exact quantity of the acid which is neceſſary to produce the proper effect, nor the preciſe time of its being mixed with the cream. But I apprehend, a table ſpoonful or two to a gallon of cream will be ſufficient; nor would I recommend it to be applied till the cream has undergone ſome conſiderable agitation.

Jan. 9, 1784. RUSTICUS.

Article XLII.

An Account of an Experiment in the Cultivation of Buck-Wheat, [*Fagopyrum*] *made at Briſlington.*

[By Nehemiah Bartley, eſq.]

Gentlemen,

BETWEEN the 14th and the 21ſt of June 1783, I ploughed a piece of land on Briſlington common, containing about twelve acacs. It

was

was harrowed in the direction of the plough. Two buſhels per acre were then ſown, and a roller was run over it. Nine acres of this ground is a reddiſh ſandy loam; the other three acres a wet clay, which, for want of draining, was ſomewhat poachy. The former produced a moſt luxuriant herbage, which effectually got the maſtery of every kind of weeds; even the quick-ſhooting fern could not keep pace with it.

The remaining three acres of clay failed very much; there not being on the whole ſo much herbage as on a ſingle acre of the other. The crop was harveſted the beginning of September; and produced upwards of twenty waggon loads of ſtraw, and only two hundred and thirty buſhels and half of grain, nearly twenty buſhels per acre.

Between the 8th and the 22d of October following, the ſame ground was ſown with red lammas wheat, two buſhels to an acre. It had one ploughing, after which the grain was cared in; the ridges dreſſed or righted, by cloſing the furrows, and trimming up the looſe earth.

In that part of the land where the buck-wheat had failed, the wheat failed alſo; and that as exactly as it is poſſible to imagine. The produce of this crop

crop was two hundred and eighty-three Wincheſter buſhels and half.* Some years preceding this experiment, (which was made chiefly to further the views of the Bath Agricultural Society) I have been in the culture of buck-wheat, and have tried it in various ſoils, and at various times of ſowing, from the beginning of April to the 22d of July. The reſult of my obſervations is, that the cultivation of this grain is well worth the huſbandman's attention; that it delights in a mellow ſandy ſoil; and ſucceeds well in any dry, looſe, healthy land, and moderately ſo in a free loamy ſtone-braſh. A ſtiff clay is its averſion, and it is entirely labour loſt to ſow it in wet poachy ground.

The moſt proper time for ſowing it, I find to be from the middle of May to the middle of June. I would chooſe rather to ſow it even in the beginning of July, than before the middle of May; for it is very impatient of cold in its firſt vegetation.

A crop of buck-wheat is, in my opinion, ſo much clear gain to the farmer, ſeeing that the land is thereby ſo well prepared for a ſucceeding crop, even better than by a fallow; beſides that it affords a noble reſource for raiſing manure.

I am, &c.

NEHEMIAH BARTLEY.

Brijlington, Feb. 10, 1785.

* Not quite twenty-four buſhels per acre.

Article XLIII.

Directions for preſerving Threſhed Wheat from Weevils and other Inſects, while lodged in Granaries.

Gentlemen,

THE preſervation of grain from the ravages of inſects, is an object of no inconſiderable conſequence to the farmer and corn-merchant.

It may, I believe, be beſt effected by timely and frequent ſcreening, and ventilation; as little or no inconvenience will follow corn or malt lodged dry, but what evidently reſults from a neglect of theſe precautions. For, whether the obvious damage ariſe from the weevil, the moth, or the beetle, that damage has ceaſed at the time the vermin make their appearance under either of theſe ſpecies; they being, when in this laſt ſtate of exiſtence, only propagators of their reſpective kinds of vermiculi; which, while they continue in that form, do the miſchief.

In this laſt, or inſect ſtate, they eat little, their principal buſineſs being to depoſit their *ova*, (eggs) which unerring inſtinct prompts them to do where large collections of grain furniſh food for their ſucceſſors while in a vermicular ſtate. It is therefore

the

the buſineſs of induſtry to prevent future generations of theſe ravagers, by deſtroying the eggs previous to their hatching; and this is beſt accompliſhed by frequent ſcreening and expoſure to draughts of wind or freſh air. By frequently ſtirring the grain, the coheſion of their ova is broken, and the nidus of thoſe minute worms is deſtroyed, which on hatching collect together, and ſpin or weave numerous neſts of a cobweb-like ſubſtance for their ſecurity. To theſe neſts they attach, by an infinity of ſmall threads, many grains of corn together, firſt for their protection, and then for their food. When their habitations are broken and ſeparated by the ſcreen, they fall through its ſmall interſtices, and may be eaſily removed from the granary with the duſt. Thoſe that eſcape an early ſcreening will be deſtroyed by ſubſequent ones, while the grain is but little injured; and the corn will acquire thereby a ſuperior purity. But by inattention to this, and ſometimes by receiving grain already infected into the granary, theſe vermin, particularly the weevils, will in a ſhort time ſpread themſelves in that ſtate every where on its ſurface, and darken even the walls by their number. Under ſuch circumſtances a hen or hens, with new-hatched chicken, if turned on the heap, will traverſe without feeding (or very ſparingly ſo) on the corn, wherever they ſpread; and are ſeemingly inſatiable

in

in the purſuit of theſe inſects. When the numbers are reduced within reach, a hen will fly up againſt the walls, and bruſh them down with her wings, while her chicken ſeize them with great avidity. —This being repeated as often as they want food, the whole ſpecies will in a day or two be deſtroyed.

Of the *phalæna*, (moth) and ſmall beetle, they ſeem equally voracious; on which account, I cannot but deem them the moſt uſeful inſtruments in nature for eradicating theſe noxious and deſtructive vermin. By this method, I have cleared two of my own granaries, which were infeſted by the weevils, very effectually.

I am, &c.

JOHN WAGSTAFFE.

Norwich, Jan. 26, 1786.

ARTICLE XLIV.

An Experiment made in Planting of Wheat.

[By Mr. ISAAC ROGERSON, Gardener.]

SIR,

IN anſwer to the Society's requeſt in the papers, a ſmall experiment which I made in planting of wheat is offered to their conſideration.

When

When a few grains have been planted in a garden, or even in a field, at ſix or nine inches diſtance, the produce has often been twice, or four times as much as what is reaped in common per acre in proportion. And yet no one, that I ever read or heard of, has undertaken to give any other reaſon for this great difference, than that of the plants ſtanding at ſuch diſtance from each other, and being kept clear of weeds. Undoubtedly, theſe advantages contribute much towards the increaſed produce: but there is another cauſe which appears to have the greateſt ſhare in producing this effect, and that I have diſcovered.

It has indeed been mentioned by writers often as an *advantage*; but no one, that I know of, ever ſaid it was the *chief cauſe* of a great crop. But if wheat, planted at ſuch a diſtance as to be kept *always* clear of weeds, produce *only double* to what is reaped in common, (ſuppoſe forty-eight buſhels, inſtead of twenty-four buſhels) on good land, well prepared, that is twelve pounds inſtead of ſix pounds per acre in value. I wonder no gentleman ever tried this method, and publiſhed the *additional* expence above the common; the additional expence I think would be very little: and only think what additional produce, what a field for national, as well as particular improvement!

Pleaſe

Pleaſe to obſerve, this method differs from the drill huſbandry; as in the latter, the whole land is not planted, the rows being ploughed between. It differs alſo from the ſetting method, as deſcribed in your firſt volume, as it does not appear the plants were *always* kept clear of weeds. But to come to the experiment.

On the 30th of Auguſt 1782, I marked out a ſquare yard of ground, with four rows, nine inches apart; I put thirty grains of wheat in each row two inches deep, this I call No. I. Nov. 12, I took four plants out of each row, and tranſplanted to No. II. alſo a yard ſquare.

No. I.		No. II.	
26	10	45	5
3	2	14	21
19	20	2	29
32	41	23	17

I kept both clear of weeds, and hoed one end of the rows, but I could not perceive any difference between that which was hoed, and that which was not hoed: I have diſcovered the cauſe. The number of ſtems of No. II. was as marked above.

The produce of No. I. was four hundred and ſeven ears, 1lb. 5 oz. of corn; ſeven hundred and fifty

fifty grains weighed an ounce. The produce of No. II. was three hundred and thirty-three ears, 1lb. 2 oz. 8 dwts. of corn; ſix hundred and eighty grains weighed an ounce. The value of the crop per acre of No. I. at 60lb. per buſhel, and five ſhillings per buſhel, is 26l. 9s. 4d.

Now the great and important queſtion is, what is the principal cauſe of ſo great a produce? There was no great expence,* and I am certain it was not the goodneſs of the land; the lightneſs of the grain ſeems to prove that: it has had no dung worth mentioning theſe twelve years. The ſnails having eaten the plants in winter, I put a little ſoot and lime on them, but that could not be the cauſe. There is much better wheat land not far from my houſe, and in the hands of a good farmer; and yet his crops are no more than about twenty-four buſhels per acre.† It appears plainly, that there muſt be ſome particular cauſe, or cauſes, of this great produce; and likewiſe a cauſe, or cauſes, why good land produces ſo much leſs in common.

* This could not poſſibly be aſcertained by ſo ſmall an experiment. If Mr. R. would plant an acre in this manner, and keep an accurate account of the expence, ſome opinion might be formed how far it would be either practicable or profitable to attempt this mode of culture on a large ſcale. But nothing perfectly ſatisfactory, or in any reſpect deciſive, with regard to general practice, can be proved from very ſmall experiments.

† Three quarters of wheat per acre only, on good land, proves there muſt be ſome capital miſmanagement in the mode of cultivation; as in the Eaſtern counties four, and very frequently five quarters are raiſed per acre on clover leys of one earth.

I wiſh, for the ſake of publick good, that the Society may think it worth their notice to inquire into it; for my part, I ſhall be very glad to ſend an account, with very convincing proofs of the cauſe, and why hoeing the wheat did not make it better. And alſo offer a new mode of agriculture.

I am, Sir,

Your humble ſervant,

I. ROGERSON.

Briſtol, Auguſt 11, 1784.

[Mr. R's further thoughts on theſe ſubjects will be acceptable to the Society.]

ARTICLE XLV.

A Table for Manuring Land.

[By the Rev. H. J. CLOSE.]

GENTLEMEN,

IT is ſome time ſince I ſent you an account of a few experiments in agriculture. I now incloſe for your approbation a table for manuring land, which ſeems to me a proper and neceſſary groundwork for every huſbandman; and I think it will be a uſeful appendage to all publications on the ſubject. If you entertain the ſame opinion of it, you

are at liberty to insert it in the next volume of those useful papers which the publick may be favoured with from your Society.

I am,

Your obedient humble servant,

H. J. CLOSE.

Trimley, Sept. 30, 1785.

A Table for Manuring Land.

Number of heaps to a Load.	1	2	3	4	5	6	7	8
At 5 yards distance	193	96	64	48	38	32	27	24
At 5½ yards	160	80	53	40	32	26	23	20
At 6 yards	134	67	44	33	26	22	19	16
At 6½ yards	114	57	38	28	22	19	16	14
At 7 yards	98	49	32	24	19	16	14	12
At 7½ yards	86	43	28	21	17	14	12	10
At 8 yards	75	37	25	18	15	12	10	9

Number of Loads to an Acre.

EXPLANATION of the first two Rows of Figures.

The number of heaps of one load each, laid at five yards distance, is 193 to cover an acre. Two heaps to a load, 96. Three heaps 64; and so on to the end. Each of the succeeding rows of figures to be read in the same manner.

ARTICLE

ARTICLE XLVI.

Experiments on the Feeding of Swine.

[By GEORGE WINTER, eſq.]

SIR,

SHOULD the following experiments be eſteemed worthy the notice of the Bath Society, you are at full liberty to make them publick.

As ſwine is one of the moſt increaſing, profitable, and ſagacious* ſpecies of animals that can be kept on a farm, they muſt deſerve the huſbandman's particular attention. I will confine myſelf to ſuch obſervations on this ſubject, as I have not yet ſeen made publick.

* I have obſerved the ſagacity of ſwine to be equal to that of any domeſtick animal. The too general barbarous treatment of kicking and beating them, as if inanimate beings, only tends to make them vicious and furious. I do not permit any of my ſwine to be in the leaſt abuſed, but give every encouragement to have them gently treated. By this mode, they will follow the boy who feeds them like ſo many dogs; and will, even in the open field, lay themſelves down to be ſmoothed and played with.

One of my labourers living near me, was lately employed on a common in front of my houſe. I obſerved his pig grazing near him all the morning. When the man went to dinner, the pig followed him; when he returned to his work, the pig returned: which induced me to be very attentive; and I found that the pig continued grazing within ten yards of him the whole day. On enquiry, I was informed that he had not purchaſed this pig more than a fortnight before, when he was ſo unmanageable, that it was with difficulty he could drive him home; and that according to his uſual method of the moſt gentle treatment, the man found that pigs could be ſo tamed, as to follow him wherever he would permit them.

From experience, I have found that ſwine prefer lucerne to clover. Laſt year I had a ſmall ſpot of lucerne adjoining to a field of clover, to both which they had free acceſs. When drove into the clover, they would immediately return to the lucerne, which manifeſtly proves it to be a ſweeter feed for ſwine. The ſuperior advantages of lucerne to clover, are great and many. Lucerne is not only earlier, and much more luxuriant in its growth, but will bear cutting four times in a ſeaſon, and likewiſe flouriſh from fourteen to ſixteen years longer than clover. The manure dropt by the pigs tends greatly to enrich the land it grows on: hence I am fully convinced of its ſuperior advantages to every other culture.

I have experienced, that neither lucerne nor clover are of themſelves a ſufficient ſupport for ſwine. A ſmall quantity of corn, peaſe, or beans, (particularly in cold mornings) is eſſentially neceſſary to be given them, before they are turned out. Such food will warm and ſtrengthen their ſtomachs, and prevent the bad conſequences of a diſorder generally called *the blood*;* which from the following circumſtances that occurred to me laſt April, I conſider as an erroneous appellation.

* Mr. WINTER, in a volume of his Eſſays, publiſhed ſince the firſt Edition of this Volume, deſcribes this diſorder as proceeding from the real want of a ſufficient quantity of blood, ariſing from the want of ſolid nouriſhing food.

My

My ſwine's feeding ſo heartily on lucerne and clover, prevented my bailiff's giving them any corn for ſome mornings. Soon after, I was informed that one of my pigs, near four months old, was affected with a diſorder called *the blood*. I immediately attended, found the pig extended on the graſs, in rather an inſenſible ſtate, with its dam near it, in a ſeeming condolent manner, bewailing the ſituation of its offspring. I ordered the pig to be put on its legs; it hung down its head, ſtaggered, and again laid down. Its belly appeared to be full, and as my people aſſured me it was *the blood*, according to the general cuſtom practiſed in this part of the country, I cut its tail, which bled a little. I had it carried to the ſtye, where it was followed by the dam. Then I ordered ſome barley-meal to be immediately ſcalded, and mixed with milk, which it would not eat, nor could any quantity be conveyed into its ſtomach by drenching. I tried ſeveral other methods to relieve it, but ineffectually. In a few hours after it died. From the appearance of its belly being full, I ſuſpected it muſt have eaten ſome poiſonous weeds, or ſwallowed ſome venomous inſect; curioſity induced me to examine its viſcera, and with all poſſible circumſpection; I firſt had its diſtended ſtomach opened, which contained only an elaſtick air, and a very ſmall quantity of the meal, and milk which

was curdled. I took the ſame precaution in having its inteſtines opened, all which contained nothing but the ſame elaſtick air as the ſtomach. All its viſcera were perfectly ſound.

To prevent the other pigs being ſimilarly attacked, I loſt not a moment's time in preparing ſcalded barley-meal, which was mixed with milk, and given them blood-warm, with a ſmall quantity of ſpirits of hartſhorn; at firſt, I fed them but ſparingly, and by degrees increaſed their quantity of food, till I thought them out of danger. Every morning after, I had them fed with corn before they were turned out; by this precaution they throve well.

Hence I am fully convinced, that lucerne or clover, without the aſſiſtance of ſome ſolid food, is not ſufficient to ſupport and nouriſh large ſwine; and that the diſeaſes they are ſubject to chiefly ariſe from improper, unwholſome food, ſuch as damaged muſty grain, (too frequently given them) or common dirty wath, or the ſtale offal of the garden, which in general is eſteemed good enough for pigs.

I have applied potatoes in different modes for feeding ſwine; giving them whole, or maſhed in the water wherein they were boiled; or the laſt mode

mode with barley-meal ſcalded and mixed in the trough. But from various and repeated experiments, I have found the following the moſt profitable method of applying potatoes, to not only the *rearing*, but likewiſe to *fattening* of hogs; varying the quantity given according to the circumſtances of rearing, or fattening.

When rearing, a ſmall quantity of food given once or twice a day, with lucerne, clover, graſs, and offals, is ſufficient.

When fattening, a conſtant ſupply is eſſentially neceſſary, ſo as not to leave the troughs incumbered with ſtale meat, which ſhould be cleared out, and given to ſtore ſwine.

An iron furnace is the moſt ſalutary for boiling potatoes. Should time or conveniency not permit to have it emptied for ſeveral days, no bad conſequence can enſue. Copper, or copper and lead, are extremely dangerous, as they generate poiſon; therefore, they ſhould be immediately emptied and cleaned.

The method I have lately adopted, and always ſhall purſue, until a better be pointed out, is, to fill about three parts of a furnace with potatoes; when

when in proportion to every five buſhels of potatoes, I ſcatter over them about a peck and half of barley-meal, then fill the furnace with potatoes, adding juſt as much water as will cover them. By this method, the barley-meal does not ſink to the bottom of the furnace, where it will encruſt and burn, nor will it be liable to be waſted by being boiled over. The nouriſhment of the barley is in a great degree extracted by the water. After the potatoes are well boiled, let the whole be mixed and bruiſed together in tubs, with a clean ſpade, ſo as to form a pulp. By this method, all the nutritive properties of the barley and potatoes are incorporated, and thereby much eaſier digeſted, and the hogs require no water.

In cold weather it ſhould be given blood warm. My barley which was ſtained by the inclemency of the ſeaſon in 1785, I had ground and uſed for this purpoſe; which prevented my purchaſing *gurgians*, which is nearly, if not equally as nutritive as barley-meal, and much cheaper.

Swine, when fattening, ſhould be kept as clean as poſſible, and well ſupplied with dry litter. As their pens are generally too ſmall to admit of exerciſe, and as they immediately lie down after feeding, I have thought it neceſſary, twice or three

times

times a week, to add about three table ſpoonfuls of ſalt to a half buſhel pail of food, which aſſiſts digeſtion, conſolidates their food, and increaſes their appetites. When too great a quantity of ſalt is given, it then acts as a purgative, which prevents their food conveying the neceſſary nouriſhment.

About once a week, I have mixed two table ſpoonfuls of madder, which prevents obſtructions, acting as a diuretick, and is at the ſame time an aſtringent. And on ſome other day in the week, I give a ſpoonful or two of an equal quantity of flour of ſulphur, and ſalt-petre, well pounded and mixed; which purifies and cools the blood. All theſe different articles added to each pail of food in the morning, on ſeparate days, entirely prevent the meazles, keep ſwine extremely healthy, and fatten them more expeditiouſly.

When ſome of my hogs were firſt penned up, they were affected with a violent cough, vulgarly called *the huſk*; which the above ingredients entirely removed in a very ſhort time.

It frequently happens, that ſwine are killed when diſordered with the meaſles, which is eaſily diſcoverable by the meat or fleſh containing ſmall globular red or white puſtules of different ſizes, varying

ing according to the different degrees of the diſeaſe which originates from their being fed with fuſty damaged corn, or ſome unwholſome food; or from their food being boiled in lead or copper veſſels, in which it has lain too long; or from their being kept in a wet and dirty pen; either of which cauſes tends to obſtruct the free circulation of the fluids; hence ariſe thoſe globular puſtules, which are the juices rendered viſcid, and coagulated.

The different articles that I have pointed out as above, will entirely remove ſuch obſtructions; purify and promote the circulation of all the fluids; and tend greatly to expedite the fattening of hogs.

I muſt further obſerve, that hogs from the age of twelve to eighteen months are the moſt advantageous to be fed for bacon, as they have then attained their full growth, will require leſs food, and fatten much more expeditiouſly than hogs that are younger.

Annexed you have a particular account of two experiments, with ſuch further obſervations as I deem neceſſary; and which, I flatter myſelf, may convey ſome uſeful information.

Your moſt obedient ſervant,

GEORGE WINTER.

Pigs purchaſed in March 1785. *Dr.*

		£.	s.	d.
March 17.	To Caſh paid P. Highman for five porkers — —	3	12	6
	To expences at and driving from market	0	1	3
	To 6 buſhels barley (tailings) and grinding	0	16	6
	To coal — — —	0	1	3
	To 44 buſhels of potatoes —	0	7	6
		4	19	0

Pigs ſold in April 1785. *Cr.*

1785.	April 21. By 2 pigs ſold to W. Hughes, weight 5 *ſcore* 7 *lbs.*			
	28. By 3 ditto 10 6			
	Total 15 *ſcore* 13 *lbs.* at 6*s.* 4*d.* a ſcore,	£4	19	0

OBSERVATIONS.

The potatoes were unſizeable for the Briſtol market, as being the largeſt and ſmalleſt. They were put out of the furnace into tubs, and the barley-meal given promiſcuouſly with the potatoes without being maſhed. I could have ſold thoſe unſizeable potatoes at eight-pence per buſhel in the country; but by this mode of application, I was only paid two-pence per buſhel, and two-pence over on the whole. Hence I am convinced,

young

young porkers will not pay for being fattened with potatoes, by this method.

Hogs Farrowed. {6, *Jan.* 14, 1785, / 9, *Feb.* 17.} *Dr.*

			£.	s.	d.
1785.	Nov. 9.	To 12 penn'd up to fatten			
	16.	To 2 ditto			
	Dec. 26.	To 1 ditto			
		15 hogs valued at	15	0	0*
	To coal — —		0	11	6
	To 14 buſhels of barley (ſtain'd) at 3s.		2	2	0
	To grinding ditto — —		0	3	6
	To 1½ lb. madder 13½d. ſalt 4s. 6d.		0	5	7½
	To flour of ſulphur, and ſalt-petre		0	1	1
	To 306 buſhels unſizeable potatoes		17	17	9½
		£.	36	1	6

Hogs, as per Contra, ſold. *Cr.*

			ſcore	*lbs.*
1785-6.				
Dec. 7.	By 2 hogs ſold to W. Hughes		13	0
28.	By 3 —— ditto		22	0
31.	By 3 —— S. Collard		23	11
Jan. 4.	By 3 —— A. Parker		20	16
12.	By 3 —— ditto		22	12
Feb. 20.	By 1 —— ditto		9	1
		Total	111	0
		at 6s. 6d. a ſcore, £.	36	1 6

* Theſe hogs were driven to Briſtol market the 27th of October, when I was offered no more than eighteen ſhillings each for the lot. I have valued them at twenty ſhillings each.

Obſervations.——The beſt ſeaſon for purchaſing hogs at the Briſtol market, is about the latter part of October or beginning of November, when the milk ſeaſon is expired, and all the corn fields gleaned. Therefore, I could have bought hogs of the ſame ſize as above, at the time mine were offered for ſale, for about eighteen ſhillings to not exceeding nineteen ſhillings.

My hogs were only nine and ten months old when put to fatten; had they been full grown, I am convinced they would have paid much more than 14d. per buſhel for the potatoes they ate.

The potatoes were entirely unſizeable for the Briſtol market, as being the ſmalleſt and largeſt. Moſt of the latter ſort were watery and hollow, weighing from one pound and half to three pounds; worth (if ſold in the country) from ſeven-pence to not exceeding eight-pence per buſhel.

The barley being ſtained, maltſters and diſtillers refuſed to purchaſe it; and the higheſt price offered to me for it was three ſhillings per buſhel, for the purpoſe of fattening hogs.

I could have purchaſed gurgians at two ſhillings and three-pence per buſhel, which I apprehend would nearly, if not equally, have been as nutri-

tive

tive as barley-meal; and thereby enhanced the value of the potatoes more than a halfpenny per buſhel. Fourteen ſhillings being the difference of the coſt of barley-meal and gurgians.

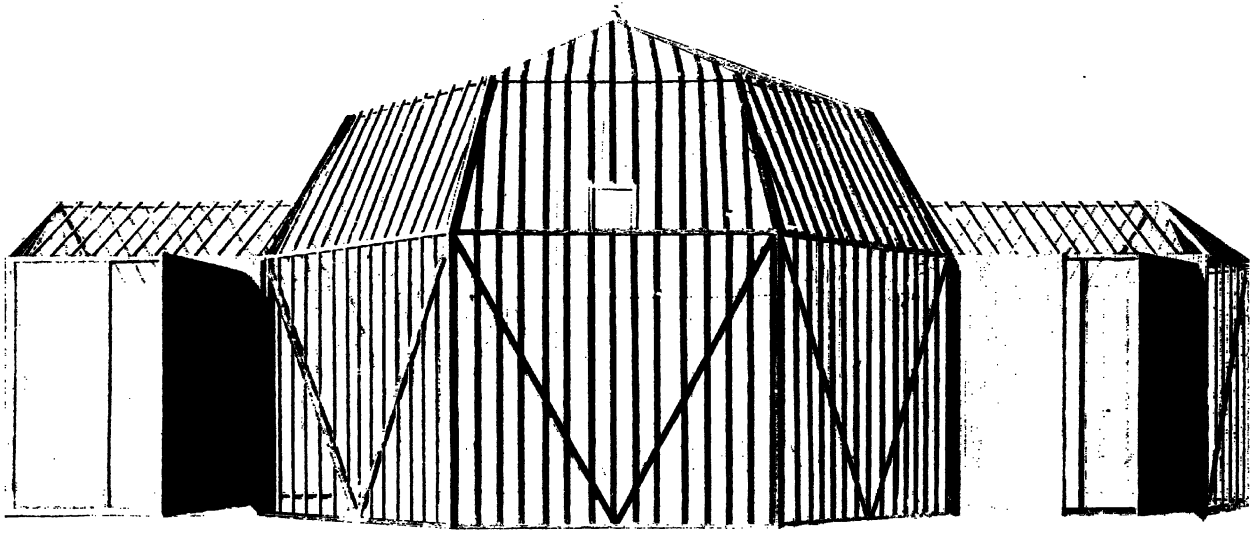
I have omitted making any charge for attending theſe hogs, as I deem the manure they have made equal in value to ſuch expence.

GEORGE WINTER.

REMARKS.

"We perfectly agree with Mr. WINTER, that large, or rather full-grown hogs yield a greater profit in feeding upon potatoes, than ſmaller ones. But in the experiments before us, the porkers ſeem to have been bought exceſſively dear, and not kept long enough to afford a fair trial of the meat. And if the large hogs had been kept a month longer, they would probably have yielded a larger profit, both from the advance of the price of their fleſh in the following month, and becauſe they are conſtantly obſerved to increaſe more in weight, and conſume leſs food in the laſt month of their fattening.

"We apprehend theſe experiments were made with the Surinam, or what is vulgarly called the white-bloſſomed potatoes, which have been found leſs nutritious than the common mealy potatoe. Beſides, no juſt concluſion can be drawn from theſe experiments to aſcertain the value of potatoes, as the hogs in both caſes were too ſmall to do juſtice to that application of them.



MODEL OF A BARN,

By. W. Henry Dobson, of the City of Norwich.

"We would recommend the full-grown Shropſhire hogs, ſuch as are purchaſed by the diſtillers at about two guineas a head when lean, as the ſort moſt likely to pay a good price for the potatoes. Theſe hogs, purchaſed in November or December, ſhould be kept at leaſt fifteen weeks, improving the quality of their food by a gradual addition of meal."

ARTICLE XLVII.

Deſcription of the Model of a Barn, for which a Premium was granted by the Society to Mr. HENRY DOBSON, *Carpenter, of Norwich.*

[With an accurate Copper-plate of the Model.]

GENTLEMEN,

FROM a deſire of promoting the laudable deſigns of a Society eſtabliſhed for ſo important a purpoſe as the improvement of agriculture, I have endeavoured, in compliance with its wiſhes, to conſtruct a barn, on a plan which I believe the model herewith ſent, and the following facts, will prove to be much ſuperior to any now in uſe.

I have compared, as well as calculated the difference, both of ſpace and quantity of timber of the preſent model, with a common barn without porches of the ſame area.

The

The ties and braces of barns, now in uſe, have always been a juſt cauſe of complaint with the farmer; the form of this renders theſe unneceſſary; which not only makes the ſpace occupied more commodious, but produces a conſiderable ſaving in the timber.

I am well aware, that the dimenſions of the threſhing-floors in this model will be objected to, as every innovation on common practice is; but to candid men, (and to ſuch only improvements ought to be intruſted) they will be found quite ſufficient.

I have obſerved, that the threſher ſeldom uſes a larger ſpace to threſh upon, than that aſſigned for this purpoſe in the preſent model; and the porches in common uſe, added to the enormous width of the barn, can ſerve for very little purpoſe more than a receptacle for the threſhed corn; the bow at the end of each threſhing-floor is intended for this purpoſe, and will contain near two laſts undreſſed or in ſacks.

The only objection that remains is, the length not being ſufficient to dreſs the corn upon, the uſual method being to fling it with a ſhovel, as much ſpread as poſſible, to the diſtance of from 20

to

to twenty-ſix feet; by which means the heavier particles fly fartheſt, and the unſound corn and hulks are of courſe left in the intermediate ſpace; as this part of the proceſs occupies as little, if not leſs time than any other, it will not be difficult to find a ſufficient time of fine weather in any ſeaſon, to place a ſail-cloth, or boards prepared for that purpoſe, to the diſtance of twelve or fourteen feet from the doors, which will then effectually anſwer every purpoſe of thoſe now in uſe.*

The following are the dimenſions of a barn 50 feet by 20½ feet, and thoſe of the model.

Dimenſions of the Model.	*Dimenſions of a common Barn.*
1472 ſquare feet the area.	1475 ſquare feet the area.
30,900 cubic feet for corn only.	24,426 cubic feet for corn only.
445 cubic feet of timber.	702 cubic feet of timber.

By which calculations it appears, that a barn built on the preſent model gains, on one in common uſe of the ſame area, 6474 cubic feet of ſpace, and is built with 257 cubic feet of timber leſs; and as there is nothing in its conſtruction which would increaſe the expence of workmanſhip, the difference between the expence of building a barn on

* As threſhing is for the moſt part done in the winter months, when the barn doors are generally frequented by cattle, poultry, and birds, great inconvenience would be found in lengthening the floor by a ſail-cloth or boards, as Mr. Dobſon propoſes. But if the corn be dreſſed with a winnowing engine (as is frequently practiſed in many counties) the length of the floor will be quite ſufficient. In every other reſpect we think this the completeſt model for a barn we have ever ſeen.

this plan, and that of one in common uſe of the ſame area, would be as 445 is to 702.

It is needleſs to ſay any thing of its mathematical ſtrength, as it muſt be obvious to any one who is at all acquainted with mechanics, that the preſent figure is of all others the beſt calculated to anſwer that purpoſe.

I am, &c.

HENRY DOBSON.

Norwich, Sept. 23, 1785.

[N. B. Mr. DOBSON writes, that the principal braces in the model, which are put in by miſtake three inches by four inches, ought to be ſix by four, and are ſo accounted in cubing the quantity of timber.]

ARTICLE XLVIII.

On Tranſplanting and Dividing the Roots of Wheat; and of Harrowing, and Rolling the Crop.

[In a Letter to the Secretary.]

SIR,

I HAD the pleaſure to be informed by your letter of the 10th inſtant, that the Bath Society had done me the honour of printing my obſervations

tions on Tranſplanting and Dividing the roots of Wheat, in their ſecond volume of Select Papers.* This flattering teſtimony of the approbation of ſo reſpectable a body of gentlemen, encourages me to offer ſomething further on the ſubject, and (as you deſire) to ſign it with my name.

I have read the notes which the Society thought proper to add to my former letter, and give them my hearty approbation. What I have now to offer, is freely ſubmitted to ſuch remarks and animadverſions as the ſuperior judgment of the Committee may deem proper.

My imagination is ſtill deeply engaged in the theory of the diviſibility of corn; and I am exerciſing my invention in attempts to produce a plan whereby the theory may be reduced to practice. I am well pleaſed to find that the practice of harrowing and rolling corn, after it has ſprung up, meets, and has received, the ſanction of the Society. It has been one of my favourite ſchemes for ſome time paſt; and I am under a thorough conviction, that, were the practice to become general in this kingdom, it would be very rare to ſee a bad crop; and we ſhould never feel the diſtreſſing effects of a ſcarcity of grain. Suffer me to intreat

* See Second Vol. Art. XVI.

the Society to take this ſubject into their moſt ſerious conſideration: it is, in my humble opinion, an object of the utmoſt importance. I will not contend with ſuch reſpectable authority as that of your Society, whether the good effect of harrowing and rolling all kinds of corn after it has ſprung, be derived from pulverizing the ſoil, or ſubdividing the roots;* it is enough for my purpoſe, that the benefits ariſing from theſe operations are fully admitted. I will therefore venture to recommend the practice, as deſerving in the higheſt degree every kind of encouragement, and do it on theſe principles:—

Firſt. The operation is ſimple, and performed with ſuch implements as every farmer has in his poſſeſſion: of courſe, when, by being excited to make trial, the farmer is ſatisfied that it is a ſafe and beneficial operation, there will be little difficulty in reconciling him to the uſe of it.

2*dly.* As the drill and horſe-hoeing huſbandry does not, among common farmers, make ſo rapid a progreſs as from its great and ſuperior advantages might have been expected, this method is the beſt that can be adopted on crops ſown broadcaſt.

* Certainly from the *former*, becauſe the latter does not take place: few, if any, of the roots are divided by harrowing.

3*dly.* When

3*dly*. When it comes more generally into practice, and is more carefully attended to, it muſt be the means of ſaving a great proportion of ſeed.‡

4*thly*. By an increaſe of grain, an increaſe of fodder, and materials for manure, are acquired, which will amply repay the additional labour.

5*thly*. As great labour is employed in fallowing land,* and yet the intended advantages are often defeated by unfavourable ſeaſons; harrowing and rolling, by being performed at the critical period, will often remedy the evil.

Laſtly. The harrows and roller are applied at the time when a field is left to its fate, and no further cultivation can be given it that ſeaſon.

I am, &c.

ROBERT BOGLE.

Strand, June 23, 1783.

‡ Doubtleſs of *ſome*; but the drill huſbandry is what (if generally practiſed) would ſave ſeed enough annually to feed half a million of people.

* This in general is very unneceſſary: Wherever turnips are well cultivated, *ſummer* fallows are never wanted; and a judicious courſe of crops will render *winter* fallows, unleſs on wet ſtiff cold clays, needleſs. With a good courſe of crops, and judicious ploughings, there is very little land in this kingdom but what will yield a profitable crop every year.

EXTRACT OF

Another Letter from the above Gentleman.

—— AS I am exceedingly impatient to have your opinion of my favourite ſpeculation of propagating wheat by tranſplanting and dividing its roots in the ſpring, I beg you will, as ſoon as convenient, ſay what occurs on the ſubject.

Since I wrote to you laſt, I have converſed much with many practical farmers, who all admit that my plan has the appearance not only of being practical, but advantageous. I have alſo ſeen, in the ninth number of Mr. YOUNG's Annals of Agriculture, the account of an experiment which ſtrongly corroborates my theory. It was made by the Rev. Mr. PIKE, of Edmonton. From this, and other experiments which have been made under my own eye, I foreſee clearly, that the ſyſtem is practicable, and will certainly be productive of great benefit, ſhould it become general. Beſides the ſaving of nine-tenths of ſeed in the land ſown broadcaſt, other very important advantages will attend the ſetting out of wheat from a ſeed-bed; ſuch as, an early crop, the certainty of good crops, rendering a ſummer fallow unneceſſary, ſaving dung, and having your wheat perfectly free from weeds, without either hand or horſe-hoeing.

Five

Five hundred plants in April produced almoſt a buſhel of grain. My gardener ſays, he can ſet one thouſand plants in a day, which is confirmed by the opinion of two other gardeners. Mr. MILLER found no difference in the produce of what was planted on lands that had dung, and on what had none, except where the land was improper for wheat at all.

I have the honour to be, &c.

Nov. 25, 1785. ROBERT BOGLE.

[Mr. BOGLE will ſee by the Society's Premium Book this year, that by having offered ſeveral premiums for experiments of the kind he ſo earneſtly recommends, we wiſh to have his theory brought to the teſt of practice. Our reaſon for this, as well as for printing Mr. B's letter, was, rather to excite deciſive trials by ingenious perſons, than from any expectation of the practice ever becoming a general one. General, indeed, it never can be. A ſufficient number of hands could not be found to do it. Unkindly ſeaſons, at the time of tranſplanting and dividing the roots, would frequently endanger and injure, if not deſtroy the crops. But admitting the mode generally practicable, we very much doubt whether all the advantages he has enumerated would be derived from this mode of culture. Why ſhould dividing and tranſplanting the roots of wheat cauſe the crop to be early, or afford a *certainty* of its being *a good one?* We cannot think that *leſs manure* is neceſſary in this method, than either in drilling or broadcaſt; nor can we by any means admit, that ſuch crops would "be perfectly free "from weeds without either hand or horſe-hoeing."

We readily agree with Mr. BOGLE, that by this mode of culture, on a general ſcale, an immenſe quantity of ſeed-corn would be annually ſaved to the nation; and in this we believe the advantage, were it practicable, would principally conſiſt.

April 1786.]

ARTICLE

Article XLIX.

A Deſcription of the Ruſſian Ploughs.

[By Dr. Grieve, late Phyſician to the Ruſſian army.]

Sir,

ON my road from Peterſburgh to Riga, I ſaw at Cuicatz a number of peaſants tilling the ground with their ſmall ſingle-horſe ploughs. Theſe inſtruments of tillage, which would excite the deriſion of an Engliſh farmer, are uſed all over Ruſſia. They are very ſimple, and conſiſt only of two poles or ſhafts, to which the horſe is harneſſed, and which extend backward, behind him, between three and four feet. To this end is fixed a croſs bar, by which the peaſant holds and directs it. About ſix inches forward from his hold, there runs down, in an oblique direction to the earth, a ſtronger piece of wood, which is divided into two points at the lower end; theſe two points form two ſocks, and are ſhod with iron. They are two inches diſtant from each other, and gently curved towards the horſe. From a rope joining the two upper ſhafts, runs down a ſmall ſtick ſhod with iron, and ſo formed as to graſp one or other of the ſocks, being tied in ſuch a manner that the peaſant can move it from the one to the other at pleaſure. This I call the turn glebe, as it turns the earth to the

the right or left according as it is placed. When fixed on the right ſock, it turns to the left, and *vice verſa*. Thus a whole field is often tilled without changing ſides; for at the end of the furrow, the peaſant has only to change the *turn glebe*, and to return in the ſame track he came. The ſmalleſt and weakeſt horſes are generally employed in this work; and I have often ſeen a woman, or a boy of fifteen, at once holding the plough and guiding the horſe. The furrows they make are ſeldom more than three inches deep, notwithſtanding the lightneſs of the ſoil.

I have frequently aſked ſome of the Ruſſian noblemen, why they did not introduce and adopt the Engliſh ploughs, which are much better fitted for turning up the ſoil from its bottom? The anſwers I received amounted to this, That in the preſent ſtate of the Ruſſian peaſantry, each man has a certain portion of land allotted him as his own, and another portion he is to till for the landlord;—that he has ſeldom more than one, or at moſt two horſes, which have neither ſize nor ſtrength ſufficient to work the Engliſh ploughs;—and that were two or more of them to join, ſtill a four-horſe plough would till but little more land in a ſeaſon than their ſingle-horſe ones. But I found the moſt powerful reaſon was, that in the Southern provinces, the ſoil is ſo rich as to require it only

to

to be lightly ſcratched over, in order to its producing the moſt luxuriant crops of every kind of grain. On the contrary, in the Northern provinces, it is ſo poor and thin, that deep ploughing would only bury the fertile part, and turn up a caput mortuum to the ſurface.

I leave theſe anſwers to be judged of by thoſe who have made agriculture their ſtudy; and ſhall only remark, that in the Northern Countries the ſoil muſt natufally be ſuperficial, becauſe the influence of the ſun is ſo; and therefore to bury too deep that part of it which has already been fertilized, would be ſurely to loſe a conſiderable part of its efficacy.

I am, &c.

Nov. 21, 1785. J. GRIEVE.

Article L.

On the Utility of thoſe Clubs called by the name of Friendly Societies, in Country Pariſhes.

Gentlemen,

AS I venerate every attempt, either in ſocieties or in individuals, to promote uſeful knowledge, improvements in the neceſſary arts, and happineſs in

in collective and civil ſociety, I wiſh to point out one ſubject which ſeems in a particular manner to merit your attention and encouragement: this is, the eſtabliſhment of Parochial *Friendly Societies* among handicraftſmen and poor labourers.

Where theſe have been eſtabliſhed, and conducted by prudent rules and regulations, they have proved very comfortable reſources to many individuals, when age or affliction has diſqualified them for labour, and alſo leſſened parochial expences.

The funds raiſed by theſe ſocieties may be conſidered as ſo much money ſaved from the alehouſe, to be applied in times of neceſſity to the beſt of purpoſes; and as each member contributes only *three-pence* a week, it is ſcarcely felt by individuals. But the advantage and relief which *ſeven ſhillings* a week affords to the *ſick*, the *lame*, and the *aged*, is very comfortable; and they are thereby freed from the painful neceſſity of applying to their pariſhes for ſupport.

As theſe *Friendly Societies* are founded on one of the wiſeſt maxims in the code of human policy; namely, *that it is eaſily in the power of the many to help the few*; I think they merit *publick* encouragement and ſupport. Therefore, if your finances will

will admit, I think you cannot beſtow a few guineas better than in offering a premium "to the moſt numerous Society of this kind, of not leſs than forty members, which ſhall be eſtabliſhed by labourers and handicraftſmen, in any country town or pariſh where no ſuch Society is at preſent inſtituted. The ſaid premium to be claimed as ſoon as the ſaid Society, of not leſs than forty members, has ſubſiſted one year."

I have preſumed to offer the above propoſal on this principle, that whatever tends to make our labouring poor induſtrious and good œconomiſts, while in *health*, and to render them comfortable when under *affliction*, is worthy your conſideration; and that theſe friendly clubs or ſocieties have ſuch a tendency, is, I think, ſelf-evident.

A poor man, flattered with the hope of receiving ſeven ſhillings per week in any future ſickneſs, will either work extra hours for the three-pence he has to pay, or ſave it from the ale-houſe. After he has been ſome years a member, it becomes habitual; and the fear of loſing all the money he has paid in, by forfeiting all the advantage he, as a member, is entitled to in caſes of accident or illneſs, will operate ſtrongly in preventing him from declining his ſubſcription. Reſources of this kind have alſo a tendency

tendency to preſerve that honeſt pride and ſpirit of independency, which the poor generally loſe when they ſubmit to parochial maintenance.

I have talked with many poor men who are members of ſuch Societies, and they all tell me they live as well as before, and find no difference at the year's end from having paid three-pence per week to their club. To uſe their own language, "*they don't feel it.*" But in times of ſickneſs, when they could not labour, they have *joyfully felt* the comforts which their little publick fund yielded them.

You will pardon me, gentlemen, for dwelling ſo long on the ſubject; but as it ſtrikes me forcibly, I wiſh to impreſs your minds with correſpondent ideas of its utility.

I am, your's, &c.

Nov. 1, 1783. A MEMBER.

In conſequence of the preceding letter being laid before the Society, JOHN ANSTIE,* eſq; of Devizes, tranſmitted to the Secretary the follow-

* The gentleman who has ſo honourably diſtinguiſhed himſelf in detecting and endeavouring to prevent the illicit exportation of wool.

ing

ing ſtate of facts, to ſhew the great utility of a Society of this kind in that town, and of which that gentleman is Treaſurer.

SIR,

I SEND you an account of monies paid by one of the clubs eſtabliſhed in this town from the year 1765, to the end of 1783. As all the members of this club may be conſidered as poor, it is not only probable, that if no ſuch club had ſubſiſted, *that the whole of this money* muſt have been drawn from the *Poor's Rates*, but even a larger ſum: for on enquiry I find, that it is a very uncommon thing for the members of the club to apply to the pariſh on *any* occaſion. The other clubs in the town are formed on nearly ſimilar principles, and therefore I ſend you only the articles of this club.

Though ſuch Societies ſhould by all means be promoted, yet I am convinced, that the increaſe of the poor's rates, particularly in large towns, is owing in a great degree to the overſeers being continued in their office only for one year; for before they become acquainted with the poor in the pariſh, they are ſubject to various impoſitions, and it being a diſagreeable office, they are glad to get through it as eaſily and as ſoon as poſſible. Whereas, were there but conſtant officers, or were they choſen for three

three or four years from the middle order of the inhabitants, with moderate ſalaries for their trouble; and were the more ſubſtantial perſons of the pariſh to inſpect their accounts quarterly, and give orders for ſuch regulations as they might ſee neceſſary; the good effects of ſuch a method, I believe, would ſoon be ſeen. I have ſerved the office myſelf twice, the laſt time *voluntarily*, as the pariſh was very much in debt, and the rates increaſing; and from my experience I am convinced, that if my buſineſs would have permitted me to have continued another year, I ſhould have been able to have reduced the payments much more than they were when I quitted the office, though even then our *debts* were cleared. But no perſon of a liberal turn of mind can be perſuaded to continue the mere drudgery of the office, though he might be willing to attend to the regulations of it.

I have thrown together my thoughts on this ſubject in haſte. And am,

Your humble ſervant,

JOHN ANSTIE.

Devizes, Nov. 10, 1783.

Scriblers

Scriblers Clvb, held at the Black Horſe, Devizes.

Caſh drawn for Sick and Burials from Sept. 1765, to Sept. 1783, diſtinguiſhing each year.

J. Fish, *Book-keeper.*

	Number of Members.	*Caſh Paid.*		
		£.	s.	d.
1765 to 1766	108	48	0	5
1766 to 1767	107	58	15	5
1767 to 1768	97	41	10	11
1768 to 1769	101	40	17	6
1769 to 1770	104	40	18	0
1770 to 1771	108	41	2	6
1771 to 1772	107	57	17	6
1772 to 1773	105	47	14	2
1773 to 1774	106	27	11	0
1774 to 1775	103	38	9	6
1775 to 1776	91	51	1	4
1776 to 1777	81	41	12	6
1777 to 1778	82	38	18	0
1778 to 1779	86	38	18	0
1779 to 1780	85	23	6	9
1780 to 1781	83	31	0	4
1781 to 1782	77	42	6	0
1782 to 1783	75	38	15	3
Eighteen years		£.748	15	1

The Annual Meeting in 1783, having read and conſidered the above letters, &c. it was reſolved unanimouſly, as an encouragement to the eſtabliſhing of ſuch Societies in country pariſhes,

" That

"That a premium of ten guineas ſhall be given to the moſt numerous Friendly Society, conſiſting chiefly of handicraftſmen and labourers, which ſhall, before the firſt day of January, 1785, be eſtabliſhed in any country town or pariſh, within either of the four counties, where no ſuch ſociety now ſubſiſts.

The conditions of this Premium are,

1ſt. That the ſociety ſhall have been eſtabliſhed one year, and conſiſt of not fewer than forty members, when the claim is made.

2d. That none of the ſaid members ſhall have belonged to any other club of this kind on the 1ſt of Jan. 1784.

3d. That no ſociety ſhall be entitled to this premium, unleſs there be a clauſe inſerted in their articles, that no part of their ſtock ſhall ever be laid out in the purchaſe of LOTTERY TICKETS, or in any other way which may riſque any part of their property in games of chance.

4th. That as ſoon as their fund amounts to one hundred pounds, one half of it ſhall be laid out in government or land ſecurity.

5th. That ſhould it increaſe in future ſo as to enable them to make any diviſion of their principal among the members, they ſhall always, on making ſuch diviſion, leave at leaſt one hundred pounds in ſtock.

6th. That every ſociety that intends to claim this premium, ſhall, at the time of its inſtitution, ſend a fair copy of their articles to this Society for inſpection before printing them.

7th. That each claim ſhall be accompanied with a certificate ſigned by the Miniſter and Churchwardens of the pariſh; containing a printed copy of their articles, the amount of their ſtock, and the number of actual members, with their names and occupations.

Claims to be made at the meeting in September 1788.

It is recommended to farmers, &c. to promote theſe ſocieties, by becoming members of them, as they evidently tend to leſſen the poor's rates."

In conſequence of this premium, ſeveral new Societies have been eſtabliſhed, and others are forming, as the Society continues to offer the ſame premium for ſucceeding years.

Article LI.

Account of various Experiments made during a courſe of Three Years, to aſcertain the Increaſe of Wheat and Barley; by Sir John Anſtruther, bart. and by him communicated to the Bath Society.

Gentlemen,

IN order to diſcover what produce wheat would yield upon rich land in a garden, from different quantities of ſeed, ſeveral rows were planted, each row was twenty feet long, and there were two feet diſtance between the rows. The following was the produce:——

Crop,

Crop, 1783.——TABLE I.

EXPERIMENT	HOLES. Grains per hole	Distance	per Foot	Grains per Foot.	EARS. per Hole	after 1 Grain	per Foot	GRAINS. per Ear	after 1 Grain	per Foot	per Square Foot
I.	2	3	4	8	46	23	184	31	7'3	5704	2852
II	7	12	1	7	55	76	55	34	267	1870	935

In 1784, the following rows were reckoned, the rows were twenty feet long, and three feet distant from each other.

TABLE II.

EXPERIMENT	HOLES. Grains per Hole.	Inches dist.	per Foot	Grs. sown per Foot	EARS. per Hole.	after 1 Grain	per Foot	GRAINS. per Ear	after 1 Grain	per Foot	per Square Foot
I.	2	3	4	8	16½	8¼	66	38	312	2508	836
II.	2	12	1	2	53	26½	53	35	9'7½	1855	618½
III.	7	3	4	28	25	3½	100	39	139	3900	1300
IV.	1	12	1	1	52	52	52	42	2'8	2184	728
V.	3	12	1	3	55	18⅓	55	45	825	2475	825
VI.	3	12	1	3	57	19	57	41	779	2337	779
			Average		43	21	63	40	533	2507	847

In 1784, twelve rows were planted, two of each with the following number of grains, the rows 3 feet distant, and 28 feet long. In 1785, the average produce of every two rows was as follows:—

TABLE III.

EXPERIMENT	Grains per Hole	HOLES. Dist. per Hole	HOLES. No. per Foot	No. of grs. per ft.	EARS. per Hole	EARS. after 1 Grain	EARS. per Foot	GRAINS. per Ear	GRAINS. after 1 Grain	GRAINS. per Foot	per Square Foot
I.	2	3	4	8	10	5	40	51	255	2040	680
II.	2	12	1	2	31	15½	31	51	790	1581	527
III.	7	3	4	28	18½	2⅝	74	51	134	3774	1258
IV.	7	12	1	7	42¼	6	42¼	44	264	1848	616
V.	1	3	4	4	18	4½	72	56	1008	4032	1344
VI.	1	12	1	1	29½	29½	29½	56	1652	1652	550½
Average					25	12¾	48	51	683	2488	829

EXPLANATION of the TABLES. [See 2d Table as above.]

The 1ſt column denotes the number of the experiments — 1
2d, the number of grains per hole —— —— 2
3d, the number of inches diſtance between the holes — 3
4th, the number of holes per foot —— —— 4
5th, the number of grains ſet per foot — — 8
6th, the number of ears per hole —— —— 16½
7th, the number of ears from each grain — — 8½
8th, the number of ears per foot —— —— 66
9th, the number of grains per ear — — 38
10th, the number of grains from each grain —— 312
11th, the number of grains per foot — — 2508
12th, the number of grains per ſquare foot — —— 836

The average of every two rows is ſtated in the above table. The greateſt increaſe after one, is from one grain per hole, and one hole per foot of the rows, and the rows at three feet diſtance.

Laſt year, one grain per foot in the rows produced 52 ears per hole, with 42 grains per ear; that is, 2184 grains after one; and as every grain has

has three feet of ſpace, or 432 inches, this increaſe is 728 grains per ſquare foot.

This year, one grain at the ſame diſtance produced 29½ per hole or foot of rows, with 56 grains per ear, which is an increaſe of 1652 after one, and 550½ per ſquare foot.

The quantity of ſeed planted is at the rate of one-twelfth of a peck per acre.

By weighing ſeveral buſhels of wheat of different kinds, and reckoning the grains in an ounce, it was found that the average weight was 60lb. per buſhel; and that in one ounce, there were 700 grains of good wheat; and of ſmall wheat, 760 grains. As there are 43560 ſquare feet per acre, this multiplied by the grains per ſquare foot, and divided by the grains in a buſhel, will give the number of buſhels per acre.

By this calculation, the 728 grains per ſquare foot laſt year will amount to 47 buſhels and three quarters of a peck per acre. And the 550 grains per ſquare foot of this year will amount to 35 buſhels 2½ pecks per acre.

The greateſt produce upon the foot ſquare is from ſeven grains per hole, and four holes per foot in rows, or 28 grains per foot, although

this is the ſmalleſt increaſe after one. Laſt year the produce of grain planted at theſe diſtances was 25 ears per hole, or 100 per foot of rows; the ears had 39 grains each; which is only 139 grains after one, but is 1300 per ſquare foot.

This year, that which was planted at 28 grains per foot, yielded 18½ ears per hole, and 74 per foot, with 51 grains per ear, which is only 134 after one, and 1258 per ſquare foot. The 28 grains per foot of rows, or 3 ſquare feet, has 15½ inches of ſpace per grain: and the ſeed is at the rate of two pecks and a half per acre.

The produce of laſt year, viz. 1300 grains per ſquare foot, is at the rate of eighty-four buſhels and three pecks per acre.

And the produce of this year, viz. 1258 grains per ſquare foot, is at the rate of eighty-one buſhels and two pecks per acre.*

This year one grain per hole, and four holes per ſquare foot, yielded more than the 28 grains

* Theſe variations of the produce of the experiments, ſhews how little a few ſmall experiments can be depended upon to eſtabliſh any ſyſtem. The greateſt produce in both theſe years, is from twenty-eight grains per foot of rows; they are more per ſquare foot than the others with ſmaller quantities of ſeed. But one row with four holes per foot, and only one grain per hole, produced more than thoſe. This experiment ſhews the great produce from one grain where it has ſpace, and the great crops that rich ground may produce.

did,

did, as it produced 1008 after one, and 1344 per ſquare foot. All the rows with more grains per foot than one, yielded more in general than one grain. But one row with the ſame number of holes per foot, with two grains per hole, yielded only 235 grains after one, and 680 grains per ſquare foot.

The average of the twelve rows per ſquare foot is 829 grains; and by the above calculation, the produce is at the rate of fifty-three buſhels and three pecks per acre of good grain. But upon weighing one ounce of this, there were 760 grains per ounce, which is one-twelfth more than is ſuppoſed in the above calculation, which would therefore make the produce of this and the others one-twelfth leſs.

As laſt year the greateſt quantity of ſeed ſown, viz. two pecks and a half, produced the greateſt produce per acre, although the ſmalleſt increaſe after one; the increaſe after one was diminiſhed from 2184 to 139. We ſee in the field that the increaſe is much diminiſhed by great quantities; as where three buſhels are ſown, if each yielded twenty after one, the produce would be ſixty buſhels, whereas it is ſeldom above twenty or thirty, which is only from ſeven to ten after one.

To

To diſcover if this decreaſe continued in proportion to greater quantities of ſeed, ſome barley was planted in ſpring 1785 both in a garden and field; in the garden ſome rows were planted at one foot in the rows, and the rows were three feet diſtant; ſome with one and two grains per hole, and ſome with 14 and 15 per hole, and others with more holes per foot. In the field,* they were planted at nine inches every way, the firſt row with one grain per hole, and increaſing the grains one every row to fourteen and fifteen; this is near three times the greateſt quantity of ſeed of the wheat planted in the garden.

On viewing the crops in May, the planted wheat, where moſt grains were dropped, looked very well, and proved good plants; but thoſe rows with few grains, and at one foot diſtance, were very bad, and had few ſtems. The barley in the

* The ridge dibbled with barley, was ninety-three yards and two feet long, and five yards broad, which is 468 ſquare yards. The Engliſh acre is 4840 ſquare yards, therefore, this ridge is the tenth and one-third of an acre; the produce of it, when threſhed, was three firlots and two pecks and three quarters of barley meaſure; this is one half more than the wheat meaſure. Therefore this ridge produced five buſhels two gallons and three quarters of wheat meaſure, or Wincheſter meaſure. By this proportion, the produce would be fifty-five buſhels one gallon and three quarters per Engliſh acre.

N. B. The wheat meaſure is about one per cent. more than Wincheſter.

garden,

garden, where there were few grains, and at one foot in rows, and at three feet diſtance, appeared extremely bad; thoſe with moſt grains, and the holes neareſt, were much the beſt. That in the field with one grain, and with few grains per hole, was very bad.

Upon examining them afterwards, when the wheat with moſt grains was about three feet high, the wheat with one and two grains was ſo bad, that it did not appear probable it would produce any thing like a crop. The barley was the ſame.

That in the field with one grain, and with few grains per hole, was bad; and as there were twelve rows, they increaſed in colour and length, as the number of grains. The firſt with one grain the worſt; and thoſe with fourteen and fifteen grains by much the beſt. But afterwards, thoſe with few grains improved ſurpriſingly, and were very good.

When in the ear, the wheat in the garden with few grains had ſeveral blanks in the rows where there were no plants, and when the ears were numbered, gave the quantity marked in the table of the barley in the garden; only thoſe three rows which were at one foot in the rows could be reckoned, the others being ſo lodged, they could not be numbered

numbered with any accuracy. Of theſe three, the produce from each hole could not be reckoned, but in each row there were twenty-eight holes at one foot; thoſe with one and two grains gave 280 ears, which is ten per hole; but as the holes could not be counted, it appeared there were ſeveral holes that produced no ears, the ſeed having periſhed. Thoſe with fourteen and fifteen gave 425, which is fifteen ears per hole; but the holes that had no ears could not be known. Of the barley in the field, the average of each row was taken at four different places.

Thoſe with one and two grains, which appeared ſo bad in ſpring, and during part of the ſummer, yielded at the rate of twenty ears per hole; and up to eight, they yielded at an average twenty ears per hole; and from eight to fifteen grains, they gave on an average at the rate of twenty-four ears per hole. There was only one row with fifteen grains gave more.

On ſome land well prepared there was one ridge of wheat tranſplanted from a field, but the froſt continued ſo long in the ſpring, that the wheat plants could not be got to tranſplant early, being ſo weak; and the ſpring being ſo dry, thoſe planted in the beginning of April all died, although watered

at

at planting; the moſt of what grew were planted the 19th and 20th of that month. They are planted at nine inches in the row, and the rows at nine inches; this makes eighty-one ſquare inches per plant; which would be 77440 plants per acre. The expence was nearly two pounds five ſhillings for taking up the plants, and planting them; but as it was a new thing, it was not ſo quickly done: if the people were accuſtomed to do it, I ſuppoſe it might be done for half the expence. The manner of doing it was as follows:

A man with a dibble, having five points of three inches long, walked backwards, and put them in with his foot in the manner a man digs with a ſpade; the dibble had a ſtrong head, and a handle like a ſpade, into which theſe five points were fixed. A boy brought a baſket full of plants from the man who dug them up, and having ſeparated the ſets, dipped the baſket in a tub of water; a boy or woman put down a plant at every hole, and a man followed, planted them in the hole, and put the earth about them with a common dibble as a gardener does; they omitted to number the grains in the ear. The number of ears per plant were reckoned at four different places of the ridge, and the average was ſixteen ears per plant; but there were a great many of the plants dead, and many blanks

blanks in the rows. As this is eighty-one inches of ſpace to the plant, this is at the rate of twenty-eight ears per ſquare foot. If the ears had only thirty grains, this would by the former calculation be a great crop, and equal to the average in the garden this year. The grain was ſmall, and one ounce contained 810 grains. The ſmallneſs of the grains might, probably, be occaſioned by the late planting and the dryneſs of the ſeaſon that followed.

This year the ſame experiment is again tried, with plants from ſeed ſown in the garden in Auguſt laſt, and ſome from ſeed ſown laſt year in October, and frequently cut over during ſummer.

I am, your obedient ſervant,

JOHN ANSTRUTHER.

London, Jan. 30, 1786.

Article LII.

Comparative view of two Crops of Barley, one drilled, and the other ſown Broadcaſt in the ſame Field.

[By Sir John Anstruther, Bart.]

Gentlemen,

I Herewith ſend you an account of an experiment made to aſcertain the produce of drilled barley, compared with broadcaſt. The ſeed was ſown on the

the ſame field, and at the ſame time; and there was no apparent difference in the ſoil.

You may depend on this account being perfectly juſt.

The drills were eighteen inches wide, and the grain was dropt by hand, the expence of which was three ſhillings and three-pence per acre.

The ſeed drilled was one buſhel and three gallons per acre. The produce was fifty-ſix buſhels and three gallons per acre.

On the broadcaſt part, the ſeed ſown was three buſhels and five gallons per acre. The produce only thirty-ſix buſhels and five gallons per acre.

Extra produce of the drilled crop about twenty buſhels per acre; beſides near two buſhels of ſeed ſaved.

I am, &c.

JOHN ANSTRUTHER.

London, Feb. 10, 1786.

Article LIII.

Short Extracts from the Letters of ſundry Correſpondents on a variety of Agricultural Subjects.

On Malt-duſt as a Manure.

[By Mr. J. Bedford, of Birch-Manor, Eſſex.]

IN April 1784, I manured a piece of land with malt-combs, or the duſt which falls through the wires, at the rate of four quarters per acre, and ſowed it with clover and barley. The barley was very luxuriant, and produced very near ſeven quarters per acre. The crop of clover was one of the fineſt I ever ſaw; and I have no doubt, but the effects of this manure will be evident in the wheat next year. From the ſucceſs attending the uſe of this malt-duſt manure, the expence of which was only eight ſhillings per acre, it appears to be much cheaper than any other; and therefore I beg leave to recommend it to the notice of the Bath Society.

On the Same.

[By the Rev. Wm. Lamport, of Honiton.]

ON my return from Cornwall, I met with a ſhrewd, ſenſible poor man, a huſbandman, who obſerved that turnip ſeed two or three years old withſtands

withſtands the fly better than new ſeed. This idea is confirmed by a gentleman farmer who ſows about eighty acres of turnips annually, and prefers the old ſeed.

If the above ſuppoſition be founded on fact, what is the cauſe of it?* Is it not owing to the new ſeed being more moiſt, and on that account poſſeſſing that greater ſweetneſs of taſte which is ſo agreeable to the fly? Age, we know, takes off a great part of the ſweetneſs in many vegetables; and there are numerous inſtances in the vegetable kingdom of old ſeed being found preferable to new.

On deſtroying Inſects on Fruit-Trees.

By the Rev. Mr. SANDERS, of Sidmouth, Devon.]

AT the requeſt of Mr. LAMPORT, the following experiment, ſucceſsfully made on fruit-trees laſt year, is now ſubmitted to the Bath Society's conſideration.

I made a ſtrong decoction of tobacco, and the tender ſhoots of elder, by pouring boiling water

* We wiſh this may become the ſubject of further enquiry by ſome of our ingenious correſpondents.

on

on them; and ſprinkled the trees with a ſmall hearth-bruſh twice a week for two or three weeks, which effectually deſtroyed the inſects. The like was tried in the garden of one of my friends, and the leaves retained their verdure until the fall of the year.

If uſed early, as ſoon as the bud unfolds itſelf, it will probably prevent the fly. The effect of tobacco has been long known; and elder-water, frequently ſprinkled on honeyſuckles and roſes, has been found to prevent inſects from lodging on them. All that is new in my practice is, the mixing them together: and the reaſons are obvious.

The quantity made uſe of was, two gallons of water, two ounces of tobacco, and three or four handfuls of elder. It may, however, be made as ſtrong as you pleaſe, it being perfectly innocent as to the tree itſelf.

Mr. BILLINGSLEY very juſtly obſerves, "It is a ſubject of much regret, that the counties within the limits of this Society ſhould be ſo far behind many other counties in the article of ploughing. Vigorous attempts have been made by the Bath Society to introduce the Norfolk and other ploughs, calculated

calculated not only to expedite the work, but to render it leſs expenſive; and their endeavours have been attended with no inconſiderable degree of ſucceſs: yet I may ſafely ſay, that not one farmer in five hundred has followed the example, though many of them daily receive ocular demonſtration of the inferiority of their own ill-conſtructed ploughs. To what can this blindneſs and obſtinacy be owing? The farmers are quick-ſighted enough in moſt other matters wherein their intereſt is concerned. I am therefore inclined to think, the fault lies more with the *ploughman* than with the maſter, whoſe indolence induces him rather to accommodate the *plough* to the *man*, than to exert himſelf in making the man accommodate himſelf to the plough."†

On Setting Wheat.

[By Sir THOMAS BEEVOR, bart. to the Secretary.]

—— WITH regard to one fact mentioned in your laſt letter, I beg leave to ſet you right.

† Herein we think Mr. B. perfectly right; and therefore the Society have offered a premium to thoſe ploughmen who ſhall moſt readily adopt and uſe properly the Norfolk plough.

It ſeems you have been informed by ſome of your correſpondents, "that the practice of *ſetting* wheat declines in Norfolk." The gentlemen, I doubt not, ſpeak *their* real opinion; but I am clear you are greatly miſinformed, as from my own obſervation, as well as from the information of others in different parts of the county, there never was known ſo many acres *ſet* as in this and a few preceding years.

In a ſeaſon when ſeed-corn is very cheap, or the autumn particularly unfavourable to the practice, it muſt certainly be leſſened; in *light* lands for inſtance, a *very dry* time prevents dibbling, as the holes made with the inſtruments will be filled up again by the mould as faſt as the inſtrument is withdrawn. So again, in a very wet ſeaſon, on *ſtrong ſtiff clays*, the ſeeds in the holes cannot be well and properly covered by the buſhes drawn over them; but theſe *extremes* of dry and wet do not often happen, nor do they affect lands of a moderately conſiſtent texture, or both light and heavy ſoils, at the ſame time, ſo that the general practice is in fact never greatly impeded by them.

Made by Messrs. WATTEAU Engineers, Manufacturers & Proprietors, Newcastle upon Tyne.

ARTICLE LIV.

A Deſcription of WM. WINLAW'S *Patent* MILL, *made upon a Plan entirely new, for ſeparating the Grain from the Ears of Corn, in place of Threſhing.*

[With an Engraving.]

THIS mill was tried in June 1785, in the preſence of many gentlemen, and gave the greateſt ſatisfaction; and ſince then, to a great number of perſons at ſundry times, who all expreſſed great pleaſure at ſeeing a performance ſo compleat, and the machine conſtructed upon a plan entirely new.

Upon trial, there were paſſed through the mill one buſhel of the heads of wheat in one minute, with very moderate labour to the man that turned it; and, by experiment, it is found that four buſhels of the ears will yield one buſhel of clean grain. This being allowed, the difference will clearly appear betwixt the expedition of the mill and the labour of a threſher; allowing that a man will threſh ſix buſhels in a day, of eight hours work, the mill will clear that quantity in twenty-four minutes, and to an incomparably greater degree of perfection than can poſſibly be done by the flail; for it ſeparates every grain from the ears,

which muſt be allowed to be a very great ſaving; whereas much corn flies off by the flail, and a great deal is loſt by foul threſhing, either when performed by taſk or day-work; and by uſing the mill, all fraudulent practices will be prevented, and the ſtraw preſerved in its original reed, which muſt anſwer the eſſential purpoſes of thatching, &c. much better than when bruiſed under the flail, and every other purpoſe equally well.

The *improved Comb* for ſtripping the ears from the ſtraw has been tried; and a lad, without having practiſed, combed out a buſhel of ears in twenty minutes, which is at the rate of ſix buſhels of clean corn for one day's work.

	£.	s.	d.
If women, children, &c. are employed for this purpoſe, at nine-pence per day, the expence of clearing a buſhel of ears from the ſtraw is	0	0	$1\frac{1}{2}$
The mill clears fifteen buſhels of clean wheat in one hour, but allowing at an average only twelve buſhels, which amounts to ninety-ſix buſhels per day; if the man that works the mill is paid 16d. a day, the expence of the mill for one buſhel is ———	0	0	$0\frac{1}{6}$
Total expence per buſhel	0	0	$1\frac{2}{3}$
But a threſher is paid for every buſhel he threſhes	0	0	4
There is conſequently ſaved by the mill, on each buſhel ——— ———	0	0	$2\frac{1}{3}$

	£.	s.	d.
Which, for ninety-ſix buſhels, or one day's work, amounts to —— ——	0	18	8
Beſides, the mill produces one buſhel in ten of clean corn more than what is done by the flail; and valuing a buſhel of wheat at five ſhillings, the advantage gained on the ninety-ſix buſhels will be ——	2	8	0
The mill will therefore gain in a day's work	3	6	8

The ſaving of grain by the mill is, the quantity flying off from the flail, and what is left in the ſtraw by foul threſhing.

If two lads are employed to ſtrip the ears from the ſtraw, they ſhould clear ſeventy-two buſhels per week, and the mill will ſeparate the grain from the ears in ſix hours.

The ſaving of corn by uſing the mill, in preference to common threſhing, being proved; the ſtraw alſo is in a preferable ſtate after it is cleared of the ears; it needs not be handled a ſecond time to prepare it for the market, as it is all combed clean and fit for uſe, without any further time being beſtowed in preparing it. The expence of repairing or relaying the barn floors ſhould alſo be a conſideration of the farmer, which the uſe of the mill entirely removes, beſides ſaving the expence of threſhing inſtruments, &c.

The argument of ſome farmers, in vindication of the old method of threſhing, is, that the corn which flies off from the flail, and what is left in the ſtraw, is not loſt, as the cattle, hogs, and fowls, eat it; but that kind of argument muſt fail, when the conſumption of the London market for ſtraw is conſidered, and other large cities and towns within the kingdom; ſuch ſtraw being uſed for litter and other purpoſes. Therefore corn is equally loſt in all thoſe uſes which ſtraw is put to, as the hogs, fowls, &c. cannot be benefited by it as in the country; and it is reaſonable to ſuppoſe, that every induſtrious intelligent farmer would wiſh to know as near as poſſible the neat produce of his farm, by having his crop clean threſhed, ſo that there be little or none remain in the ſtraw when meaſured out to his ſtock of beaſts, poultry, &c. By ſo doing he will come at the expences he ought to know, and his ſtraw be equally ſerviceable for the various purpoſes it is made uſe of in London or any where elſe.

I have tried the experiment of threſhing the corn clean out from ſeveral truſſes or bundles of ſtraw, and found that a truſs, which weighed thirty-ſix pounds, contained in it two pounds four ounces of wheat, which meaſured (after thoroughly cleared) two pints and a half. Thirty-ſix truſſes are a load, and, according to this experiment, in one load are

ninety

ninety pints, or five pecks and ten pints; conſequently, in the thouſands of loads conſumed in this metropolis, there is a very great loſs to the community; but the number is beyond my power to aſcertain. W. W.

Deſcription of the Mill.

It requires very little practice to enable any perſon to manage the mill. The dart painted on the fly directs which way to turn the handle, it being pointed as it ſhould be turned. The hopper, which ſerves to feed the mill, is regulated by the two round pins, to which the cords are fixed. The ſcrew at the bottom of the frame is to adjuſt the diſtance of the inner nutt from the outward cone; for if it be ſcrewed upwards too much, it will bruiſe the grain; if lowered down too far, it will admit the ears to paſs without effect. The croſs bars, that ſupport the axis on which the fly and pinion are fixed, are moveable upward and downward as occaſion requires. When the ſcrew at bottom is turned to the right, it moves the nutt upward, and gives leſs ſpace. The wedges muſt be ſlackened above, to admit the axle to riſe upward or downward as may be found neceſſary. Theſe wedges may be ſlackened or tightened with great eaſe, and without any danger of injuring the mill.

Refcrences

References to the annexed Plate.

A, A, A, A, the Frame of the Mill
B, the outward Cone
C, the large Iron Wheel
D, the Regulating Screw
E, the Pinion
F, the Hopper, to receive the Ears
G, the Top Curb ſurrounding the Nutt
H, the Fly
Fig. 1. The Mill
2. Combing the Sheaf
3. The Comb for ſtripping the Ears
4. The Hand Comb.

Directions for Combing the Bottom of the Sheaves, and ſtripping the Ears from the Straw.

The frame of the comb is made in the form of a croſs, with a comb fixed to every limb, that four perſons may work at once if requiſite, according to the figure in the annexed plate. The teeth or prongs are made of ſteel, and of an angular form, ſet at convenient diſtances, ſo as to ſtrip the ears clean; if ſet too wide apart, they will paſs through without effect, and if too near together, will not admit the ſtraw to go between.

The mill, upon a ſmaller ſcale, anſwers equally well for clover-ſeed; the flowers being firſt threſhed off from the ſtems, it will clear as much ſeed from the outward integument or huſk in three hours as a man can perform, in the common mode of threſhing, in one week; for a man cannot clean much above a buſhel in that time. The tedioufneſs of the

the operation is an evident reaſon why the ſeed bears ſo high a price; the barn-floors are likewiſe quickly deſtroyed by that tedious forcible performance. It alſo anſwers for flax-ſeed, canary, or any other ſmall ſeed; alſo for ſeparating the huſk from rice, which, by the preſent method in practice, is performed at a great expence of time and hard labour. The ſame methods may be obſerved in regulating the ſmall mill for clover-ſeed, as the corn-mill.

The mill being capable of theſe performances, as above related, will render it very uſeful to gardeners, nurſerymen, ſeedſmen, &c. as the whole is performed by one plain conſtructed machine, eaſily managed, and not liable to be out of repair.

The *objection* made by ſome gentlemen, againſt the mill coming into general uſe, is, their fear of not finding employment for their threſhers. To this I anſwer; if gentlemen and farmers pay proper attention to improving their waſte lands, and other improvements requiſite in huſbandry, they will be at no loſs to find employment for their threſhers.

The improvements made of late years in our cotton manufactories, by the help of uſeful improved engines, is ſufficient to confute the notion which many people have, that thoſe improvements

are

are hurtful to the labouring intereſt of the kingdom, when it is plainly proved that the contrary is the fact, many thouſands of poor people being employed by their means, which would not have had it in their power to get employment otherwiſe; conſequently many of thoſe would have been chargeable to their reſpective pariſhes, who now are uſeful members of Society.

If all men who are capable of combining mechanick powers, ſo as to make uſeful improvements in machines for various purpoſes, ſhould agree in ſentiment with thoſe inconſiderate arguers, who obſtinately perſiſt in uſing only thoſe implements which long cuſtom has rendered moſt familiar to them, there would be a total ſtop put to all mechanical improvements whatever; for ſurely no man would be at the expence of time, labour, and materials, in improving or inventing machines to expedite labour, either in agriculture or mechanics, which would ſatisfy the ingenious enquiring part of mankind only, when, by the fallacious arguings of others, they are ſure to be oppoſed, and find only diſappointment, in their labour and expence, for the pains taken in endeavouring to ſerve the publick. But it frequently happens, that the more utility a new invention is of to the publick, the more numerous are its oppoſers; and the proprietor meets with almoſt inſurmountable difficulties, before

fore thoſe, for whoſe benefit it is intended, will condeſcend to make fair trial of the experiment; the common methods having been ſo long followed, renders many uſeful attempts of improvement abortive.

The method I would recommend to gentlemen, for a proper trial of the comb, is to employ ſome tractable, active perſon, either man or woman, void of prejudice, to practiſe for a month or two together; and in that time they will, by practice, have gained conſiderable experience, and be more active and capable of inſtructing others. I would have put this in practice myſelf, but have not an opportunity, wanting materials.

The farmers in Devonſhire, and ſeveral other parts of the country, after combing the ſheaves with the hand comb, cut the ears off with a common knife, and find it anſwer their purpoſe, both in reſpect to ſaving corn, and having their ſtraw at once prepared for the various uſes intended. This practice having been long eſtabliſhed among them, they find no difficulty in performing the taſk; and it only requires the reſolution of gentlemen in other counties, to oblige their ſervants to conform to the ſame rule, and obey their commands in this and every uſeful improvement in huſbandry.

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The improved comb will clear three times the quantity in a given time, as can be done by the method practiſed in Devonſhire; which ought to be conſidered as ſufficient encouragement to make trial of the experiment.

Article LV.

Value of Turnip-Rooted Cabbage as a Spring Crop.

[By Sir Thomas Beevor, bart. to the Secretary.]

My good Friend,

MY turnip-rooted cabbages are now in high perfection. I have about three acres left, with which I am feeding twenty-two bullocks intended for fattening this ſummer; ſeventeen cows, two bulls, four young cattle, and one hundred and ten ſheep, beſides thirty horſes, which partake largely of them. I hope and expect they will yet laſt near a fortnight more, by which time I doubt not but I ſhall have a full and plentiful bite of graſs for all my ſtock. In order to aſcertain in ſome degree the quantity of food they produced, I carefully ſelected ſome of them, and ſome of the common turnips; and having girted each of them with as much accuracy as poſſible, I found the turnip-rooted

rooted cabbage of the circumference of 18 inches, weighed 5¼lb. and the common turnip of the ſame circumference 3½lb. only. I took others of different dimenſions, and found throughout the reſult to be in that proportion. They were all without their tops, otherwiſe the exceeding of the turnip-rooted cabbage would have been greater; the tops of them being remarkably buſhy. It muſt however be mentioned, that thoſe roots were weighed at the latter end of March; had they been weighed at Chriſtmas, it is likely the difference had not been ſo great. Still their late continuance for a green and moſt nouriſhing food, is indiſputably a merit they muſt be allowed, beyond any other known vegetable production.

Our weather continues yet very cold, but moderate ſhowers are forwarding vegetation in defiance of North-eaſt winds. We have now ſnow, whilſt I write this, but it melts as it falls.

I am, with real regard, your's,

THOMAS BEEVOR.

Hethel, May 1ſt, 1786.

Article LVI.

Calculations of the Weight per Buſhel, and the Number of Grains, of ſundry Seeds.

[By George Winter, eſq; of Charlton.]

ONE acre of land drilled at a foot diſtance, on ridges of 8 feet 3 inches wide, contains in length 505,880 inches.

A buſhel of wheat, weighing 62 pounds, contains 516,000 grains. Dropping one grain to an inch requires leſs than a buſhel to an acre.

A buſhel of barley, weighing 52 pounds, contains 515,000 grains.

A buſhel of Poplar or pig peaſe, weighing 64 pounds, contains 107,000 peaſe.

A buſhel of horſe beans, weighing 64 pounds, contains 35,000 beans.

A buſhel of oats, weighing 32 pounds, contains 1,260,000 grains.

As all grain, &c. vary in ſize, the number contained in a buſhel will be increaſed or diminiſhed: but the above are the average numbers.

G. W.

Article LVII.

On the very great Advantages which may be derived from ſetting out Plants of Wheat, and other kinds of Corn, in the Autumn, Winter, and Spring.

WE muſt obſerve, that we received a letter from Robert Bogle, eſq; of Daldowin, near Glaſgow, dated the 20th of April, 1783, ſigned R. B. recommending an experiment made by Mr. Miller, Profeſſor of Botany at Cambridge, in the year 1766, "On the very great Produce "of Wheat by Tranſplanting it," to the attention of the Society; and Mr. Bogle in that letter alſo recommended the practice of harrowing all kinds of corn in the ſpring where the appearance is unpromiſing. Our readers will find that letter and Mr. Miller's experiment in our ſecond volume, page 156, and the ſubſtance of ſome others in the preſent volume.

Mr. Bogle has ſince communicated to us his thoughts upon thoſe two ſubjects at large, and alſo authentick accounts of ſeveral experiments which were made at his inſtance, and which were attended with very great ſucceſs; but although we conſider the objects recommended by him as worthy the attention of the publick, yet we have

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to regret that we have received his communications ſo late and ſo immediately on the eve of this publication, that we have neither time nor room to inſert them at full length.

However, as we conceive his ſyſtem may be attended with conſiderable advantages if brought into general practice, we ſhall ſtate briefly a few of his leading principles; and muſt requeſt, that ſuch of our readers as may make, or may have already made, experiments either in tranſplanting or harrowing of corn after it is ſprung up, will be pleaſed to favour us with accounts of the good or bad ſucceſs attending them.

Mr. Bogle ſtates the following propoſitions:—

1*ſt*. That he has known many inſtances of very great crops having been obtained by harrowing fields of corn after they were ſprouted; and therefore recommends the practice very warmly.

2*dly*. That he has alſo received an authentick account of one inſtance where the ſame good effects were produced by ploughing the field.

3*dly*. On the ſyſtem of tranſplanting, he ſtates, that a very great proportion of the ſeed will be ſaved, as a farmer may have a nurſery, or ſmall patch

patch of plants, from which his fields may be ſupplied; he calculates that one acre will yield plants ſufficient for one hundred acres.

4*thly*. That a very great increaſe of crops may be obtained by this method, probably a double crop; nay, perhaps a triple quantity of what is reaped either by drilling, or by the broadcaſt huſbandry.

5*thly*. That a great part of the labour may be performed by infirm men and women, and alſo by children, who are at preſent ſupported by the pariſh charity; and that of courſe the poor's rates may be conſiderably reduced.

6*thly*. That the expence will not exceed from 20s. to 30s. per acre, if the work be performed by able-bodied men and women; but that it will be much lower, if that proportion of the work which may be done by employing young boys and girls, ſhould be allotted to them.

7*thly*. That in general he has found the diſtance of nine inches every way a very proper diſtance for ſetting out the plants at; but recommends them to be tried at other ſpaces, ſuch as ſix, eight, or even twelve inches.

8*thly*. That he conceives an earlier crop may be obtained in this manner, than can be obtained by any other mode of cultivation.

9*thly*. That a clean crop may alſo be procured in this way, becauſe if the land be ploughed immediately before the plants are ſet out, the corn will ſpring much quicker from the plants than the weeds will do from their ſeeds, and the corn will thereby bear down the growth of the weeds.

10*thly*. That ſuch lands as are overflowed in the winter and ſpring, and are of courſe unfit for ſowing with wheat in the autumn, may be rendered fit for crops of wheat by planting them in the ſpring, or even in the ſummer.

11*thly*. That he has known inſtances of wheat being tranſplanted in September, October, November, February, March, April, and even as late as the middle of May, which have all anſwered very well.

12*thly*. That he has known an early kind of wheat ſown as late as the middle of May, which has ripened in very good time; and from that circumſtance he conceives, if the plants ſhould be taken from that early kind, the ſeaſon of tranſ-

planting

planting might be prolonged at leaſt till the 1ſt of July, perhaps even later.

13*thly*. That he has reaſon to think wheat, oats, and barley, are not annuals, but perennials, provided they are eaten down by cattle and ſheep, or are kept low by the ſcythe or ſickle; and are prevented from ſpindling or coming to the ear.

14*thly*. That one very prevalent motive with him in proſecuting this plan, is, that he is of opinion, it may enable Government to deviſe means of ſupporting the vagrant poor, both old and young, who are now to be met with every where, both in towns and in the country, and who are at preſent a burden on the community: but if ſuch employment could be ſtruck out, a comfortable ſubſiſtence might be provided for them by means of their own labour and induſtry; and not only ſave the publick and private charitable contributions, but may alſo render that claſs of people uſeful and profitable ſubjects; inſtead of their remaining in a uſeleſs, wretched, and perhaps a profligate and vicious courſe of life.

And *laſtly*, Mr. Bogle has hinted at a ſecondary object which he has in view, from this mode of cultivation, which he apprehends may in time, with a ſmall degree of attention, prove extremely advan-

tageous to Agriculture. It is, that the real and intrinſick value of different kinds of grain may be more accurately aſcertained by making a compariſon of it with a few plants of each kind ſet out at the ſame time, than can be done when ſown in drills or broadcaſt; and when the moſt valuable kinds of wheat, oats, or barley, are diſcovered, he ſtates, hat in a very ſhort time (not exceeding four or five years) a ſufficient quantity of that valuable kind may be procured to ſupply the kingdom with ſeed from a ſingle grain of each kind; for he calculates, that 47,000 grains of wheat may be produced by diviſibility in two years and three months.

Although Mr. BOGLE appears to be too ſanguine in his expectations of ſeeing his plan realized in *general practice*, we think it merits the attention of Gentlemen Farmers, and wiſh them to make fair experiments, and report their ſucceſs. Every grand improvement has been, and ever will be, progreſſive. They muſt neceſſarily originate with Gentlemen; and thence the circle is extended by almoſt imperceptible degrees over provinces and countries. At all events, Mr. BOGLE is juſtly entitled to the thanks of the Society, and of the publick, for the great attention he has paid to the ſubject.

APPENDIX: